Background: A partial glossectomy results in a lingual defect that can have detrimental effects on speech. A more complete understanding of glossectomy speech may aid in the identification of new therapeutic strategies. Previous research on tongue movement suggests that midsagittal tongue velocity increases following a partial glossectomy (Rastadmehr et al., 2008).

Objective: The research objectives of this study were to compare preoperative and postoperative tongue movement during speech in glossectomy patients, using cine-magnetic resonance imaging (cine-MRI) and videofluoroscopy. The outcome measures were tongue velocity, movement range, and average tongue height.

Methods: The eight patients in this study were diagnosed with anterior and lateral carcinomas of the tongue and/or the floor of the mouth. As a result, patients underwent a partial glossectomy and reconstruction. The videofluoroscopic and MRI recordings were made a few days before and approximately four weeks following the surgery, prior to radiation therapy. The cine-MRI data were recorded at 8 fps. The speech stimuli consisted of nine German words with various consonants and vowels of interest. Patients repeated each of the nine words at least three times. Measurements were made using the Ultra-CATS software, which permits a frame-by-frame analysis of tongue movements.

Results: Principle Component Analysis was used to determine the functional segments of the tongue. Three components were identified, pertaining to anterior (ATR), center (CTR), and posterior (PTR) tongue regions. For the videofluoroscopic data, paired samples t-tests were conducted to compare preoperative and postoperative tongue movement. The results for the videofluoroscopic data suggest that tongue velocity decreased following the glossectomy surgery for all patients and for all nine words. Due to the small sample size, an alpha level of 0.1 was used. The decrease in tongue velocity was significant for the following tokens: PTR region for <theke>, ATR region for <juli>, PTR region for <juli>, ATR region for <rosi>, ATR region for <schaedel>, CTR region for <kino>, PTR region of <kino>, and ATR region of <Koenig>. There were no significant effects for tongue movement range and height before and after the surgery. The statistical analyses of the MRI data are currently underway. However, qualitative observations of the MRI data confirm the findings from the videofluoroscopic data.

Conclusion: The loss of lingual tissue resulted in reduced tongue velocity. This contradicts the findings from Rastadmehr et al. (2008), who found acceleration in tongue velocity following a lingual resection. The opposing findings may be attributable to differences in speech tasks, patients, and surgical techniques.