BACKGROUND: Diffusion tensor imaging (DTI) tractography enables the graphical reconstruction of the white matter pathways in vivo. The use of this technique to display the key fiber tracts in brain tumor patients for reducing the risk of post-operative neurologic deficit has increased in recent years. However, the effects of peritumoral edema pose a major challenge to the conventional single-tensor streamline fiber tracking method. OBJECTIVE: To present a novel technique using the two-tensor unscented Kalman filter (UKF) algorithm for the tracking of arcuate fasciculus (AF) in brain tumor patients by resolving the effects of peritumoral edema. METHODS: Ten patients with malignant brain tumors in the vicinity of language-related areas underwent 3-T magnetic resonance imaging including a diffusion-weighted data set with 31 gradient directions. DTI data was preprocessed using an automatic quality control pipeline method. Fiber tracking was performed using both single-tensor streamline and two-tensor UKF tractography. A two-regions-of-interest approach was applied to perform delineation of the AF. Results from two different algorithms were compared side-by-side. RESULTS: Single-tensor streamline and two-tensor UKF tractography showed fundamental differences in mapping the fiber tracts in the edema area surrounding the malignant brain tumor. Using single-tensor streamline tractography, 4 of 10 patients showed disrupted and incomplete AF and the remaining six patients demonstrated only a slender fiber bundle. In contrast, the two-tensor UKF tractography could fully delineate the AF within such edematous brain areas in all ten patients. CONCLUSION: The findings suggest that two-tensor UKF tractography provides the ability to trace the AF more accurately than single-tensor streamline tractography particularly in the setting of peritumoral edema in brain tumor patients. UKF tractography may be helpful in the quest to preserve the language function in brain surgery.