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Multi-Session Cranial SRS With Gamma Knife ICON(R) : A Single Center Experience- Early Outcomes and Early Lessons

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Abstract
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Dheerendra Prasad [1], Richard Wang [2], Sarunas Tamasauskas [2], Victor Goulenko [2], Robert Plunkett [3], Robert Fenstermaker [4], Andrew Fabiano [4], Lindsay Lipinski [5], Matthew Podgorsak [6]

1. Department of Radiation Medicine, Roswell Park Cancer Institute, Buffalo, USA 2. Division of Gamma Knife Radiosurgery, Roswell Park Cancer Institute, Buffalo, USA 3. Neurosurgery, Roswell Park Comprehensive Cancer Center, Buffalo, USA 4. Neurosurgery, Roswell Park Cancer Institute, Buffalo, USA 5. Department of Neurosurgery, Roswell Park Cancer Institute, Buffalo, USA 6. Radiation Oncology, Roswell Park Cancer Institute, Buffalo, USA

Corresponding author: Dheerendra Prasad, d.prasad@roswellpark.org

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Abstract

Objectives:

To undertake a systematic analysis of the early experience with multi-seesion SRS, with the first Gamma Knife ICON(R) in North America and identify the emerging indications and role of the technique in intracranial SRS.

Methods:

Retrospective review of the Roswell Park Gamma Knife database was used to identify patients treated with multi-session SRS. Data in dosimetry, imaging and clinical characteristics were summarized as well as early outcomes analyzed.

Results:

Gamma Knife ICON(R) was used to treat 3711 patients between March 2016 and March 2022. Of these 374 patients (10%) underwent multi-session SRS. The main indications for preferential utilization of multi-session techniques were atypical meningioma, high grade glioma and brain metastases exceeding 12 cc in volume or located in eloquent cortex or the brainstem. Number of sessions varied from 2-5 with 3 sessions being the modal number. The most frequent dose prescriptions were 24Gy in 3 session and 25 in 5 sessions. Inter-session interval was variable. In 36 patients deliberately longer intervals (7 days or more) were utilized to benefit from early volume reduction and adaptively planning the subsequent sessions. This reduced overall treated volume and reduced critical structure doses. Details of this population are summarized in the study. Early outcomes analysis revealed that control rates in this group are comparable to single session SRS. Complication rates were low (3.6%) and included headaches, persistent edema, seizures and new neurological deficits. Tumor control rates were 92% for brain metastases, 87% for Atypical meningiomas, 95% for Grade I meningiomas, and 83% for treated recurrence areas of high-grade gliomas who failed outside of the SRS field.

Conclusion(s):

Multi-session and adaptive SRS with Gamma Knife ICON is safe and effective and opens the possibility of new indications as well as possible role for side effect reduction when targets are located in critical or eloquent brain lesions.