Introduction
With continuing technology improvements in accuracy and precision, stereotactic radiosurgery (SRS) is expanding as a treatment option for multiple brain metastases. With frameless immobilization, on-board imaging for targeting confidence, and the more precisely adjustable Varian PerfectPitch™ six degrees of freedom couch, clinicians at Dartmouth-Hitchcock’s Norris Cotton Cancer Center are able to treat multiple brain lesions in significantly less time, in a single RapidArc® radiotherapy technology procedure.

Transforming brain SRS
Dartmouth-Hitchcock Medical Center clinicians started using the PerfectPitch couch for frameless brain SRS in February 2014, and they credit it with transforming how they perform this treatment procedure. The PerfectPitch couch can be adjusted remotely with submillimeter accuracy using six degrees of freedom, including normal 3D linear motion, pitch, roll, and yaw. Patient shifts are calculated based on analysis of a cone-beam CT, applied from outside the vault, and saved automatically to the ARIA® oncology information system.

With the improved positioning precision and efficiency possible with the PerfectPitch couch, clinicians routinely treat up to five brain lesions in one treatment. “You can treat multiple lesions sequentially, but if you’re going to treat four or more, and you average half an hour per lesion, then you’ve got the patient on the table for two hours or longer. On the other hand, if you can treat four lesions at the same time, then you can do the entire treatment on the order of thirty to forty-five minutes, certainly under an hour,” says Alan Hartford, MD, PhD, section chair of Radiation Oncology. The PerfectPitch couch is playing a significant role in reducing the treatment time for these complex brain cases.

Having daily first-hand experience with the PerfectPitch couch, Craig Hansen, chief therapist, credits it with helping to change some SRS brain treatments from an all day ordeal to a treatment session that takes less than one hour. “The entire process on a patient in a head frame can take from 7 am to 5 pm. We are now able to treat many of these cases with an open-face mask. With this frameless technique and the PerfectPitch couch, we can treat multiple lesions with RapidArc within an hour, usually less than that.”

Minimizing margin and brain toxicity
Most importantly, the quality of treatment is improved, says David Gladstone, ScD, chief of Clinical Physics. “The PerfectPitch couch enables us to use RapidArc to treat multiple lesions simultaneously with a high degree of confidence that we have good geometric integrity. For five individual isocenters that we used to do with cones, we were quite happy with conformity index values around 2.0. Now with RapidArc capabilities, we’re talking about conformity index numbers down to around 1.2 or 1.3. The reason that the PerfectPitch couch is important here is that one-degree of rotation results in one millimeter of linear motion at six centimeters distance. With the head being 14 centimeters, you can understand the impact for any lesion lying peripherally. It can be the difference between having to add a millimeter of margin or not,” Gladstone explains.

Hartford highlights the ramifications in more detail with a patient example. “We recently designed volumes for a patient who has five lesions spread out supratentorially and infratentorially. Some of these lesions are very small, a few
Case Study | PerfectPitch in Clinical Use

Devices presented in this case study may not be available in all markets.

**Intended Use Summary**

Varian Medical Systems’ linear accelerators are intended to provide stereotactic radiosurgery and precision radiotherapy for lesions, tumors, and conditions anywhere in the body where radiation treatment is indicated.

**Safety**

Radiation treatments may cause side effects that can vary depending on the part of the body being treated. The most frequent ones are typically temporary and may include, but are not limited to, irritation to the respiratory, digestive, urinary or reproductive systems, fatigue, nausea, skin irritation, and hair loss. In some patients, they can be severe. Treatment sessions may vary in complexity and time. Radiation treatment is not appropriate for all cancers.

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