AbstractID: 9440 Title: Helical tomotherapy for craniospinal irradiation with field junctioning

Purpose: To present an algorithm for craniospinal radiation using helical tomotherapy (HT). Brain tumor patients at risk for tumor diffusion through the cerebrospinal fluid often require craniospinal irradiation. Craniospinal treatments require large radiation fields, up to 80cm. When treated with conventional radiotherapy, craniospinal treatments require one or more junctions which might result in high/low dose regions within the target and normal tissue. This study will present a technique to reduce the junctioning effect using HT. **Method and Materials:** Twelve craniospinal irradiation plans were created using HT for six patients. Each case is planned using two treatment plans; the first is designed to irradiate the cranial region, while the second is for the spinal region. The field length involved in craniospinal treatments dictates the split into two plans. The cranial region plans use 1cm jaw width for pediatric cases and 2.5cm for adults, while the spinal region plans use 2.5cm jaws for pediatric cases and 5cm jaws for adults. The small jaws result in good dose conformity and critical organ avoidance in the brain region, while the large jaws are needed in the spinal region to keep the treatment time reasonable. A junction region between the cranial and the spinal regions is defined to minimize the overlap between the two fields. **Results:** The treatment plans for the six cases show acceptable dose distribution for the spinal, cranial and junction regions, while keeping the dose to critical organs under tolerance. Dose uniformity in the junction region stays within 10% of the prescribed dose. Total treatment time for both plans depends on the target length in the cephalo-cauded direction and stays within 25 minutes for a 75cm target length. **Conclusion:** Treatment plans for the six cases show that field junctioning in HT, when carefully designed, can generate acceptable treatment plans for craniospinal irradiation.