The Long Term Effects of Radiotherapy treatment on Vestibular Schwannomas in NF2 Patients

M. Whittaker¹, A. O'Connor¹, G. Wong¹, W. Ahmed¹, A. Parry², D. Halliday², R. Obholzer¹
1. Guy's & St Thomas' NHS Trust, 2.Oxford University Hospitals NHS Trust

Background

Stereotactic radiosurgery (SRS), including Gamma Knife Surgery (GKS), is a well-established treatment for vestibular schwannoma. 10 year progression-free survival has been quoted at 90% with this treatment modality^(1,2). In the context of Neurofibromatosis Type II (NF2) tumour control rates with radiotherapy are reportedly lower, closer to 80% at 10 years⁽³⁾, with significantly higher rates of refractory tumour growth⁽⁴⁾. However studies in this population are limited, with small patient numbers and generally shorter periods of follow-up. We present experience from two specialist NF2 centres, Guy's & St Thomas NHS Trust and Oxford University NHS Trust.

Results

90 treated tumours were identified in 80 patients. 5 tumours were treated with conventional fractionated radiotherapy, 85 tumours with stereotactic radiosurgery (mean 13Gy). 50 patients were followed up beyond 5 years of which 77% remained stable. 10 patients were followed up beyond 10 years of which 80% remained stable. Only 4 and 1 patients were followed up beyond 15 and 20 years respectively, all of which remained stable (see figure 1). No complications were identified following conventional radiotherapy, compared to SRS where 21 early (within 6 months), and 6 late complications were recorded (see figure 2). In cases of treatment failure, 7 patients received Avastin, and 2 underwent microsurgical resection.

Discussion

The results in our cohort of NF2 patients demonstrate response rates to radiotherapy that are comparable to current literature, and imply that the effects of treatment are maintained beyond 5 years. Concern has been expressed about the use of GKS in this cohort, who are treated relatively young, in that it may only provide a limited period of control, however our data does not support this notion.

Figure 1: tumour size following radiotherapy

(1) Hasegawa, T., et al. (2013). "Long-term safety and efficacy of stereotactic radiosurgery for vestibular schwannomas: evaluation of 440 patients more than 10 years after treatment with Gamma Knife surgery." *Journal of neurosurgery* 118(3): 557-565.
(2) L. Dade Lunsford, et al. (2005). "Radiosurgery of vestibular schwannomas: summary of experience in 829 cases." *Journal of neurosurgery* 102(s_supplement): 195-199
(3) Mathieu, D., et al. (2007). "Stereotactic radiosurgery for vestibular schwannomas in patients with neurofibromatosis type 2: an analysis of tumor control, complications, and hearing preservation rates." *Neurosurgery* 60(3): 460-470
(4) Wowra, B., et al. (2005). "Outpatient gamma knife surgery for vestibular schwannoma: definition of the therapeutic profile based on a 10-year experience." *Journal of neurosurgery* 102: 114-118
(5) Subach, B. R., et al. (1999). "Stereotactic radiosurgery in the management of acoustic neuromas associated with neurofibromatosis Type 2." *Journal of neurosurgery* 90(5): 815-822

Figure 2: complications following radiotherapy

Contrary to current thinking our evidence suggests that the probability of a tumour remaining stable appears to increase over time. Our complication rates highlight hearing loss as the most common adverse event with approximately 50% of patients experiencing a deterioration. This figure has been noted in other studies in this patient population⁽³⁾. Similarly, reported rates of facial palsy range between 8-21%^(3,5), comparable to our observations. Although tumour control rates are lower than those observed in non-NF2 population we advocate that GKS remains a viable treatment modality for enlarging VS in NF2. A non-invasive option is of particular relevance in this patient group most often presenting at a younger age with multifocal tumour burden.