

Case Study

Stereotactic radiotherapy of orbital metastasis from malignant melanoma: a case study

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(Received 18 September 2014; revised 8 October 2014; accepted 14 October 2014; first published online 21 November 2014)

Abstract

Objective: Orbital metastases lead to many distressful symptoms.

Methods: A case-report of a 44-year-old woman with a melanoma metastasis in the orbital cavity, is reported. A patient presented with headache, proptosis and diplopia. The stereotactic radiotherapy of 19.5 Gy in three fractions using CyberKnife was performed. Follow-up examination 7 months later revealed satisfactory local control of the tumour, alleviation of orbital symptoms with no negative impact on visual function.

Conclusion: Stereotactic radiotherapy seems to be a safe and effective treatment of orbital metastases from melanoma.

Keywords: CyberKnife; malignant melanoma; orbital metastasis; stereotactic radiotherapy

INTRODUCTION

Disseminated melanoma has a dismal prognosis with only few months of median survival. The local treatment of metastases may in selected cases achieve local control and prolong survival, as mainly reported with melanoma brain metastases.¹ Disseminated melanoma may present sometimes with orbital/eye metastases, which had an extremely negative impact on patients' quality of life, but the deficiency of data on its treatment does not allow the reliable evaluation of indications and treatment outcome.^{2–4} The radiobiological and physical advantages of

radiosurgery or stereotactic radiotherapy, make that method attractive also in such tumour location, however any convincing data are lacking. Therefore, the aim of own study is to report the case of orbital metastasis from melanoma, treated with stereotactic radiotherapy.

CASE PRESENTATION

A 44-year-old female was radically operated in 2007 with diagnosed and histologically confirmed skin melanoma of the left lower limb (Clark-IV, Breslow-3.5 mm, pT3bN0, R0 margins, no metastases in a sentinel node).

Four years later disease recurred as an in-transit and few distant metastases. Patient was treated

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Figure 1. The magnetic resonance imaging of pre-treatment orbital metastasis.

initially with multidrug chemotherapy which was changed into Ipilimumab due to progression. Four months later brain computed tomography (CT) was performed because patient complained of a headache. The CT showed isolated left orbital metastasis. The ophthalmic examination revealed best correction visual acuity 1.0 (Snellen Charts), intraocular pressure of 22 mmHg (Goldmann applanation tonometry), no visual field defect (Goldmann and Humphrey' perimetry). Anterior segment and fundus examination revealed no detectable changes.

One month later due to extraocular pain, 5 mm proptosis and restriction of movements in the nasal direction together with diplopia patient was referred to Department of Radiotherapy and she was proposed stereotactic radiotherapy of orbital metastasis. Before radiation procedure best-corrected visual acuity (BCVA) was 1.0 and intraocular pressure (IOP) was 23 mmHg and no other changes were detectable. On magnetic resonance imaging (MRI) the tumour had a diameter of $3.5 \times 1.7 \times 1.9$ cm (volume: 5.92 cm^3), involving the medial rectus muscle and adhering to the optic nerve on a distance of >2 cm (Figure 1).

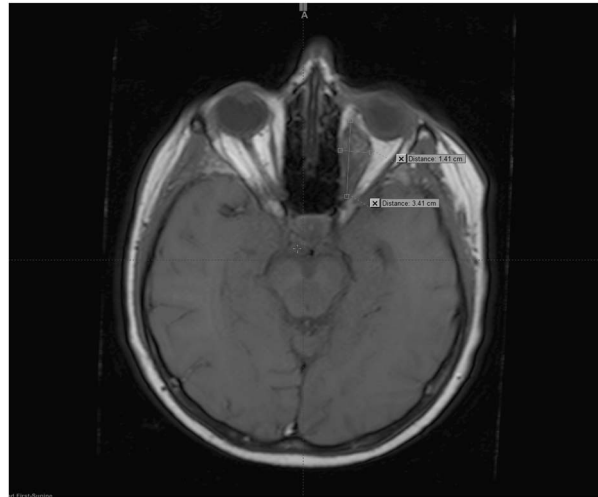


Figure 2. The magnetic resonance imaging of orbital metastasis 2 months after stereotactic radiotherapy.

After 2 weeks the stereotactic radiotherapy was performed with three fractions of 6.5 Gy to the total dose of 19.5 Gy using CyberKnife—a miniature 6 MV accelerator fitted onto a mobile robotic arm.⁵ The treatment was well tolerated, only chemosis slightly increased and mild ciliary flush appeared, which were successfully managed for 10 days with 0.1% Dexamethasone eyedrops.

One month post-treatment, a multiorgan dissemination occurred. The regression of orbital metastasis was observed on MRI and CT with tumour diameter of $3.4 \times 1.4 \times 1.6$ cm (volume: 3.99 cm^3), which gave 30% regression (Figure 2). The patient also reported the good subjective local effect in orbit, that is, almost complete remission of pain. The ophthalmic examination revealed BCVA 1.0, IOP 19 mmHg decreased exophthalmus to 2 mm no visual field defect and no diplopia.

Patient started chemotherapy with B-RAF inhibitor (vemurafenib), initially with a good response, but after 4 months the rapid progression and deterioration of general status occurred. Seven months after stereotactic radiotherapy the patient was last examined, and still reported full function of left eye without recurrence of previously observed negative symptoms. The last ophthalmic examination revealed (BCVA) 1.0,

(IOP) 20 mmHG, no exophthalmos, no restriction of movement in all directions no diplopia and no visual field defect. Pain was not reported by a patient. The CT study of the head (because of poor general status additional MRI was not performed) revealed further regression of orbital metastasis (diameter $2.0 \times 1.4 \times 1.5$ cm; volume: 2.2 cm^3 ; 60% regression as to initial volume). Patient died 1 month later—8 months post-radiotherapy.

DISCUSSION

To the best of our knowledge, we present the first a case of orbital malignant melanoma metastasis, its impact on eye function and outcome of fractionated stereotactic therapy with CyberKnife. In this particular case we planned radiotherapy achieving successful treatment outcome as proved by findings and as self-reported by patient. Metastases to the orbital cavity are characterized by a variety of acute negative clinical symptoms, such as exophthalmos, vision disturbances and pain, significantly decreasing the patient's quality of life.^{2–4} This justifies the attempts of local treatment.

The vast majority of publications on radio-surgery/stereotactic radiotherapy of melanoma metastases is focused on brain, lungs or liver^{1,6,7} what is incomparable with presented location. Especially, orbital metastases which adhere to the eye require extremely precise radiotherapy to obtain tumour regression together with minimizing damage of very sensitive eye structures. It should be mentioned that melanoma is now considered to have a broad spectrum of radiosensitivity, making radiotherapy attractive.⁸ The stereotactic radiotherapy was performed with CyberKnife, which monitors and tracks tumour/patient position continually during treatment, making itself more precise. This precision could be crucial for optic nerve sparing. Although, there was one study on stereotactic radiosurgery of orbital metastases with CyberKnife, that was performed using one single fraction, which was not advisable in our patient because of direct adherence of metastasis to the optic nerve.⁹ Considering the final result, total dose and fractionation seemed to be optimally planned regressing significantly tumour size, and safe for optic nerve. The data on

optic nerve tolerance to stereotactic radiation are scarce, however other authors, faced with tumours near the optic tract (e.g., meningioma) presented a similar approach without significant complications.¹⁰

CONCLUSION

The stereotactic radiotherapy seems to be safe and effective treatment of orbital metastasis from malignant melanoma.

Acknowledgements

All authors contributed to the paper and fulfilled criteria for authorship.

Conflicts of Interest

All authors confirm no conflict of interest and nothing to disclose.

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