

Role of Gamma Knife Radiosurgery in Management of Intracranial Meningioma Located in the Cavernous Sinus: Short Review

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Abstract

Cavernous sinus meningioma can be removed surgically, with the advent of microsurgical techniques and newer skull-base approaches. However, surgical removal of cavernous sinus meningioma still carries a mortality and high morbidity especially related to cranial nerves injuries. We report a case of left cavernous sinus meningioma in a 60-year-old elderly female received primary Gamma knife surgery. After gamma knife surgery, she noticed a progressive improvement in neurological status this was also correlated with magnetic resonance imaging (MRI) scan obtained two years after gamma knife surgery, which revealed almost complete disappearance of meningioma.

Keywords: Cavernous Sinus Meningioma; Gamma Knife; Radiosurgery Surgical Control

Introduction

Improvement in cranial base surgery the cavernous sinus meningioma can be removed with acceptable morbidity [1,2]. However, surgery of the cavernous sinus meningioma carries a high morbidity because of handling of cranial nerves during surgery. The usefulness of gamma knife radiosurgery of cavernous sinus meningioma is reported recently [3-6]. Radiosurgery can achieve a significant tumor size control rate with relatively very low morbidity rate. Cavernous sinus meningioma is often associated with compression of the optic apparatus. However, surgical resection is sometimes difficult for tumors located in a difficult location, as our case had meningioma confined to the cavernous sinus. Radiation dosages to the optic apparatus is a major limiting factor, which warrants reduced dosage delivery to the tumor, which may correlate with poor control rate. [5] In such cases, surgery is indicated. We report an elderly female, where primarily gamma knife radiosurgery was given due to poor medical health and suffering with multiple co-morbid illnesses.

Case Report

A 60-year-old diabetic and hypertensive elderly female presented with insidious onset double vision and drooping of the left eyelid of two years duration, which was slowly progressive. She also developed constant headache for the last six months, which was not responding to analgesic. She was known hypertensive and diabetic for last 15-years, she had undergone abdominal hysterectomy, during that period she also contracted hepatitis B. On admission, she was conscious, alert. She had left-sided oculomotor and abducens nerve palsy. She had loss of sensation over left trigeminal

VI distribution. No motor deficits were noticed, cerebellar signs were conspicuous by absent. magnetic resonance imaging (MRI) of the brain revealed left cavernous sinus mass lesion showing hypointense signal on the T1 weighted image and hyperintense on T2 weighted image. On gadolinium-DTPA. The administration showed enhancement. She underwent gamma knife radiosurgery with Cobalt 60 gamma knife (Elekta Instruments. Norcross, GA). The minimum radiation dose was 12 Gy. The 50% iso-dose was used to cover tumor. The radiation dosage to optic apparatus was kept minimal. She had an uneventful period following gamma knife radiosurgery, except mild nausea and pain at pin application site. She had regular follow-up.

She noticed a regression of headache and improvement of paresis of external ocular muscle movement. A cranial MRI of brain at two years of follow-up revealed almost complete disappearance of meningioma except for very small residual in left cavernous sinus.

Discussion

The result of surgical treatment of cavernous sinus has improved significantly. However, it still associated with significant morbidity. Sekhar, et al. [7] operated 114 cases of cavernous sinus meningioma, with a 78% of total surgical excision and 43% rate of preservation of the same or better extraocular muscle functions in the postoperative period. However, 95% patient could return to the job but still have significant extraocular muscle dysfunction. 20% cases, which had subtotal excision of meningioma, had regrowth of tumor after a mean 3.9 years of follow-up. De Monte, et al. [1] analysed 41 cases of cavernous sinus meningioma, total excision in 76% cases. The cranial nerve function improved in 14%

and remained unchanged in 80% and rest 6% cases noticed worsening.

Nutting, *et al.* [8] reported conventional fractionated external beam radiation could achieve 10-year progression free survival of cranial base meningiomas, without fresh cranial nerve dysfunction in over 83% cases. Even the radiosurgery caused less radiation damage to the surrounding structures sparing the optic apparatus. Long-term risk of the malignant transformation is supposed to be less frequent in view of the focus radiation to the small volume of neural tissue. It is postulated even if clinical efficacy of gamma knife is same as conventional radiotherapy for control of tumor growth rate and preservation of cranial nerve, radiosurgery is, however, preferred. There is only a few reports usefulness of radiosurgery in the treatment of cavernous sinus meningioma. Kida, *et al.* [4] treated 25 cases of cavernous sinus meningioma, reported a control rate of 87.5% and permanent deficit occurred in their 5.9 % patients.

Duma, *et al.* [5] analysed their 34 cases of cavernous sinus meningioma. 56% cases showed regression in the size of tumor, and 24% improved clinically. In our case, she had marked improvement in neurological status following the gamma knife surgery. The extraocular muscle function recovered remarkably, and tumor also showed unremarkable shrinkage with the almost disappearance of the lesion, which was seen on repeat MRI at follow-up. However, follow-up in our case is very short. Long-term follow up is required to monitor re-growth of the meningioma [9].

Conclusion

The patients who are harbouring cavernous sinus meningioma and suitable neurosurgical facility is not available or patient is not fit for surgery, a Gamma knife radiosurgery can provide a suitable alternative. It can provide good tumor control rate with improvement or minimal fresh neurological dysfunction.

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