Operative management of patients with radiosurgery-related trigeminal neuralgia: Analysis of the surgical morbidity and pain outcome

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A B S T R A C T

Object: Trigeminal neuralgia (TGN) occurring after radiosurgical treatment of cerebellopontine or petroclival tumors may be very difficult to control. Our aim was to determine the efficacy of radiosurgical treatment in regards to pain control and to evaluate the procedure-related complication and morbidity rates.

Methods: Retrospective study of a series of operated patients with radiosurgery-induced TGN. The primary goal of the surgery was to inspect and decompress the trigeminal nerve; the second goal was to remove the tumor remnant completely, if safely feasible. The main outcome measures were pain control, time to onset of pain relief and its duration, occurrence of new neurological deficits or worsening of the existing one and completeness of tumor removal.

Results: The four patients met the inclusion criteria: 2 with vestibular schwannomas, 1 with petroclival meningioma and 1 with an epidermoid. TGN occurred 12–60 months after radiosurgery (mean 39 months). At presentation the pain attacks occurred multiple times daily and lasted from a few seconds to 2–3 min. The complete tumor removal via the retrosigmoid approach was achieved in all cases. There were no major operative complications or persistent morbidity, besides one patient with trochlear nerve palsy. All patients experienced immediate pain relief after surgery. At follow-up (median duration – 42.5 months) the three patients reported complete pain resolution. One patient had occasional slight pain but did not need any medications.

Conclusion: Surgery is safe and effective treatment option of patients with intractable radiosurgery-induced TGN. It leads to excellent pain control and is curative in regards to the neoplasic disease.

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1. Introduction

Radiosurgery is widely used as an alternative to microsurgery in case of small cerebellopontine angle (CP angle) or petroclival tumors or as an adjunctive treatment following incomplete tumor removal. The reduction of prescription doses to 12–15 Gy led to decline in the posttreatment morbidity rates [1–5]. Trigeminal neuropathy – facial paresthesias or numbness – is by far the most common non-audiofacial radiosurgery-related neuropathy and develops in 2–8% of the patients [1,3,4,6–8]. Trigeminal neuralgia (TGN) as a complication of radiosurgical treatment has been occasionally reported. Putative pathogenetic mechanisms are direct radiation-induced injury of the trigeminal fibers in the brainstem or of the compressed by the tumor trigeminal nerve root. Although the trigeminal pain is usually transient [9], in some patients, it may persist and is extremely difficult to control. The systematic analyses of the management options and outcome of treatment of intractable radiosurgery-induced trigeminal neuralgia have never been published in the literature. Some patients have been treated with medications, some underwent second radiosurgery, while in others the tumor remnant was removed via the translabyrinthine approach [1,18,24]. The success rate of these procedures in terms of pain control, however, has not been reported.
syndrome in all cases. In all cases, however, the volume of tumor remnant did not change essentially during the follow-up. The pain developed only after the radiosurgical treatment, which indicates that the radiation contributed essentially to the pathogenesis of the pain syndrome.

4.2. Management options

The patients with trigeminal neuralgia, described in previous publications, have been treated medically [20], with repeated gamma knife irradiation targeting to the trigeminal nerve [19] or
surgically [24]. The pain outcome in most studies is not specifically addressed. Schulder et al. [24] presented a patient with a vestibular schwannoma who developed pain in the trigeminal nerve distribution following gamma knife treatment. The patient was operated three years later because of tumor growth. Following surgery the patient was neurologically unchanged. In this patient the pain was certainly caused purely by the irradiation: in contrast to our cases the tumor had no relation to the trigeminal nerve. The surgery may not be efficient in the absence of nerve compression or fixation by scar tissue. Kano et al. stated that multimodality pain management strategies were required in most patients with skull base meningiomas associated with trigeminal neuralgia [27]. The epidermoids are not considered suitable for radiosurgery and the experience is rather limited [28].

The trigeminal neuropathy after radiosurgery may be transient and spontaneous pain alleviation may occur [14]. Moreover, in some cases, it may improve with medical therapy. Hence, we recommend initial medical therapy trial with at least two different drugs in sufficient dosage. If the pain severity does not decrease for a period of at least twelve months, the patient should be offered the option of microsurgical management. In our series all the patients had inadequate pain relief with the medical therapy and/or failure of the percutaneous radiofrequency thermocoagulation. The primary goal of surgery in our cases was to inspect and decompress the trigeminal nerve from any possible tumor- or scar-induced compression. The removal of the tumor remnant was a secondary goal. The extent of resection was estimated at surgery, considering the intraoperative findings: preservation of neurological functions had a priority. Safe complete tumor removal turned out to be feasible in all patients. There was no major persistent morbidity in the series. The outcome in regards to pain control was excellent: three patients reported at follow up complete resolution of the pain and one patient had occasional slight pain but did not need any medications.

5. Conclusion

Surgery is safe and effective treatment option of patients with tumor remnants and intractable radiosurgery-induced TGN. It leads to excellent pain control and is curative in regards to the neoplastic disease.

References