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Radiotherapy

Efficience of Radiotherapy in Unresectable Carotid Paraganglioma

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Abstract **Case Report**

Paragangliomas are benign tumor. The first line treatment is surgery. However when this treatment is not feasible, radiation therapy remains an effective therapeutic alternative, that allows local control with acceptable morbidity, demonstrated by the clinical case presented in this publication. The follow up characterised by regression or stability of the lesion and improvment of neurological symptoms.

Keywords: Paraganglioma, Radiotherapy, Surgery, Carotid, Unresectable.

INTRODUCTION

Paragangliomas are rare benign tumors, developed at the expense of carotid chemoreceptors. The first-line treatment is surgical resection, when feasible, recommended for its ability to reduce the risk of neurological and vascular morbidity secondary to large tumors [1]. However, when surgery is not feasible, radiotherapy remains an effective therapeutic alternative allowing local control with less morbidity. We report the case of a patient with unresectable carotid paraganglioma that was controlled locally by external beam radiotherapy. The aim of this work is to illustrate the crucial role of external radiotherapy as a therapeutic alternative to surgery in cases of unresectable tumor.

CASE REPORT

This is a 60-year-old man without a medical history, who consulted in 2023 when he feeled headaches with tinnitus for which a brain MRI was performed. Imaging revealed a mass separating the internal and external carotid artery, measuring 11*11 mm, suggesting a carotid paraganglioma on brain MRI, and right oto mastoiditis highlighted in figure 1. The case was discussed with the radiotherapy staff of the National Institute of Oncology, who decided to recommend exclusive external radiotherapy given the location of the tumor near the left carotid arteries. The radiotherapy treatment used intensity-modulated radiotherapy. The treatment was delivered in 2 arcs, with a total dose of 50 Gy by conventional fractionation, i.e. 2 Gy per fraction, in 25 fractions. Intensity Modulated Radiation Therapy is the standard irradiation technique for head and neck cancer, because it reduces the risk of toxicity better than 3D conformal radiotherapy. For our observation, radiotherapy treatment was carried out in 1 target volumes, highlighted in the figure 2. The treatment was carried out on good conditions, with regular monitoring of the positioning by Cone Beam CT control images. Radiotherapy was delivered to the target volume in order to have local control of the disease, while respecting healthy organs located near the tumor volume called organs at risk and which must be spared as much as possible, in order to avoid the side effects of radiotherapy. These organs were delineated in our case and their constraints were respected. The evolution was marked by an improvement in neurological signs with stability of the lesion thus defining local control at 36 months, highlighted in figure 3.

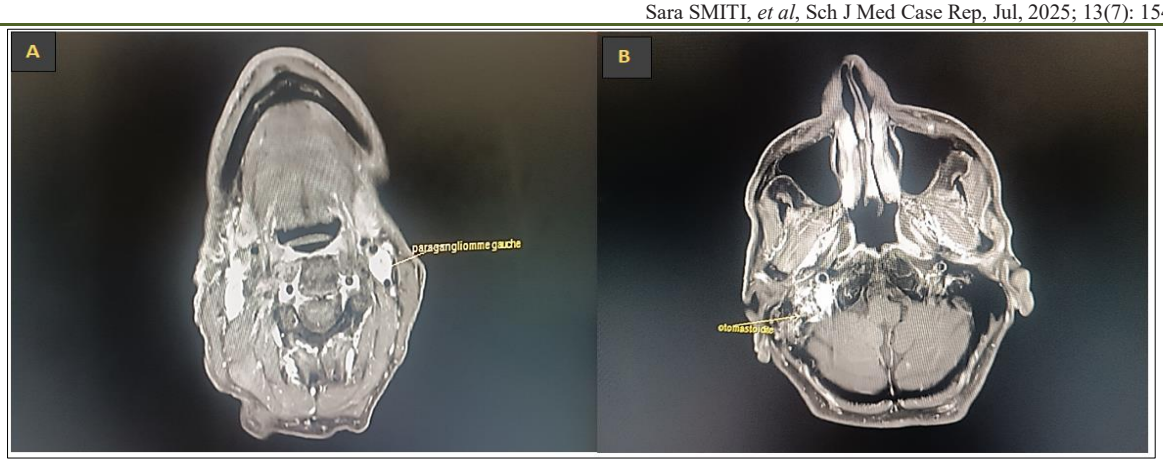

Figure 1: Cerebral MRI shows a mass spreading the internal and external carotid arteries, measuring 11*11 mm, suggesting a left intercarotid paraganglioma, and right oto mastoiditis.

Legend Figure 1: A shows the paraganglioma tumor in the left side. B shows the oto mastoiditis in the right side

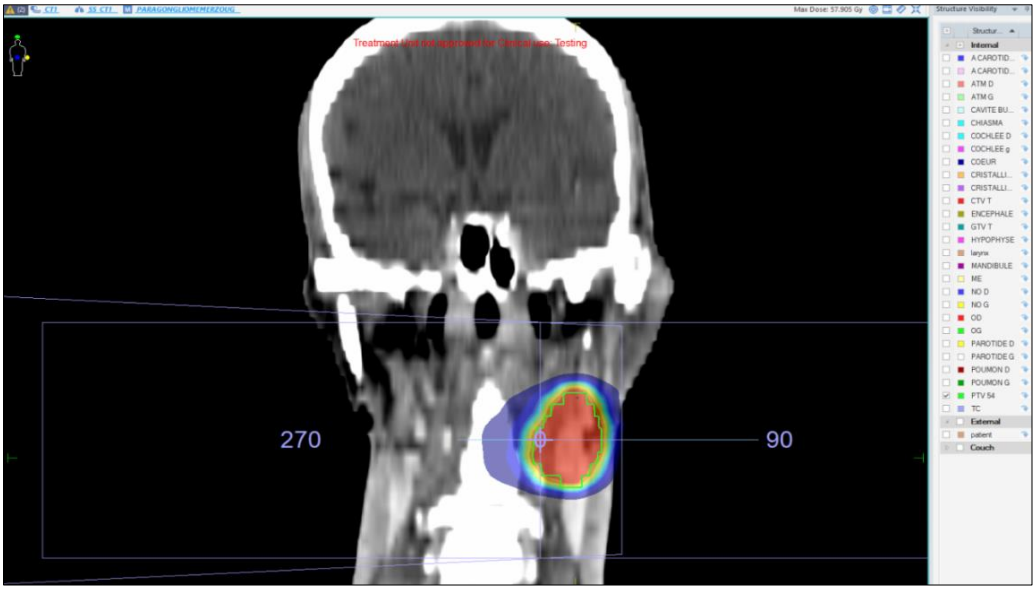

Figure 2: Delineation of target volume and organs at risk of the case of paraganglioma

Legend Figure 2: The green volume represent the target volume, the red space is the isodose 95%

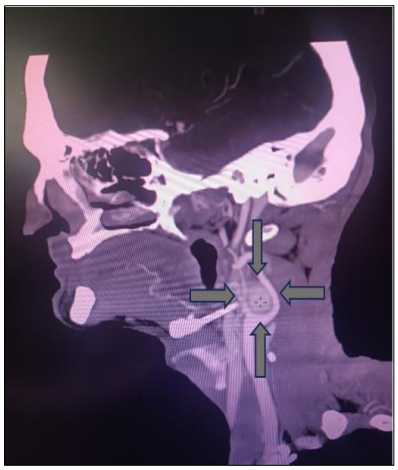

Figure 3: follow-up cervical CT scan

Legend Figure 3: follow-up cervical CT scan shows a left lateral cervical mass compatible with his known paraganglioma of stable appearance.

DISCUSSION

Carotid paragangliomas represent 60 to 70% of paragangliomas in the cervicoencephalic region [2]. Their slow progression often results in diagnostic and therapeutic delays. Surgical resection remains the first-line treatment. External radiotherapy has been reserved for post-surgical recurrences, malignant or unresectable tumors as in our described case. However, several studies have reported similar efficacy of radiotherapy (fractionated or stereotactic) and surgical treatment [3, 4]. In the series reported by Zabel *et al*., 22 patients with skull base paragangliomas received radiation therapy by stereotaxic fractionated conformal radiotherapy at a mean dose of 57.6 Gy. After a mean follow-up of 5.7 years, overall survival was 89.5% at five and ten years, and the local control rate was 90.4% at five and ten years [3]. In a cohort of 21 patients who received external beam radiotherapy at a dose of 50Gy for cervicoencephalic paragangliomas, the five-year local control rate was 95% without major toxicity after a mean follow-up of 55 months [4]. The necessary radiotherapy dose was not established; it varies from 30 to 70Gy in all the reported studies [5-7]. It seems that there is a link between the dose received and the response. Indeed, according to Kim *et al*., the optimal dose should be greater than 40Gy, the local failure rate being lower (1%) for patients having received a dose more than 40Gy (n=142) and higher (25%) in patients having received a dosage less than 40Gy (n=83) [8]. Other studies confirm that the dose is necessary and sufficient to control this benign and slowly evolving tumor, and seems to be between 40 and 50 Gy [9, 10], administered in 25 fractions spread over 5 days per week, or over an average of 35 days. This dose makes it possible to avoid toxic effects, in particular necrosis and temporal osteoradionecrosis, while ensuring satisfactory local control. It is therefore a compromise between efficacy and tolerance: below 40 Gy, relapses are observed [11], while above 50 Gy, their rate does not seem higher. In our case we obtained a clinical and radiological response, at a dose of 50 Gy, with a usual fractionation of 2 Gy per session, in five weeks. It should be noted that the majority of lesions remain stable or only regress modestly during radiological evaluations after radiotherapy [8-12], thus we speak of local control after radiotherapy of paragangliomas when the tumor lesion regresses or remains stable on control imaging, and/or when neurological symptoms improve or do not worsen [10]. And our case study perfectly meets this definition. In fact, the effectiveness of radiation treatment is defined not by the disappearance of the tumor but by its "control", that is to say, the stabilization and the absence of reappearance of symptoms as well as by the absence of further evolution and radiological progression [13]. The literature therefore seems to demonstrate that the use of radiotherapy is satisfactory: On the oncological level, the results of local control of the tumor can reach 95 to 100% of cases for follow-up of up to ten years; on a functional level, it would stabilize and improve neurological damage [14–16]. Facial and auditory functions are most often preserved at the end of treatment, particularly since the reduction in doses administered. This has led to a redefinition of the classic role of radiotherapy, recognized essentially for three main indications :Exclusive in cases of inoperability linked to the size of the tumor, to invasion of the internal carotid artery with poorly tolerated clamping test or to a single homolateral or deficient contralateral venous return ; surgical contraindications of various kinds , or bilateral forms ; complementary to incomplete surgery and recovery in the event of surgical failure or progressive recovery. Moreover, severe complications of radiotherapy are the prerogative of older techniques. Currently with modern devices and computerized treatment planning, radiotherapy is better tolerated with minor side effects [11].

CONCLUSION

The external beam radiotherapy is an attractive alternative to surgery in the treatment of unresectable carotid paragangliomas, providing local control, which means regression or stability of the lesion and less neurological symptoms, with a lower risk of morbidity. This opens up the prospect of studies with a larger sample size for better statistical evaluation.

REFERENCES

1. Pellitteri PK, Rinaldo A, Myssiorek D, Gary Jackson C, Bradley PJ, Devaney KO, et al. Paragangliomas of the head and neck. Oral Oncol 2004;40:563—75.DOI 10.1016/j.oraloncology.2003.09.004
2. Bougrine F, Maamouri F, Doghri R, Msakni I, Sabbegh, Znaidi N, et al. A rare tumor of the carotid glomus. J Mal Vasc 2008;33:214—7.DOI 10.1016/j.jmv.2008.06.003
3. Zabel A, Milker-Zabel S, Huber P, Schulz-Ertner D, Schlegel W, Wannenmacher M, et al. Fractionated stereotactic conformal radiotherapy in the management of large chemodectomas of the skull base. Int J Radiat Oncol Biol Phys 2004;58:1445—50.DOI: 10.1016/j.ijrobp.2003.09.070
4. Lightowlers S, Benedict S, Jefferies SJ, Jena R, Harris F, Burton KE, et al. Excellent local control of paraganglioma in the head and neck with fractionated radiotherapy. Clin Oncol 2010;22:382—9.DOI: 10.1016/j.clon.2010.02.006
5. Hinerman RW, Mendenhall WM, Amdur RJ, Stringer SP, Antonelli PJ, Cassisi NJ. Definitive radiotherapy in the management of chemodectomas arising in the temporal bone, carotid body, and glomus vagale. Head Neck 2001;23:363—71.DOI: 10.1002/hed.1045
6. Evenson LJ, Mendenhall WM, Parsons JT, Cassisi NJ. Radio therapy in the management of

chemodectomas of the carotid body and glomus vagale. Head Neck 1998;20:609—13.DOI: 10.1002/(sici)1097-0347(199810)20:7<609::aid-hed5>3.0.co;2-8

7. Mumber MP, Greven KM. Control of advanced chemodectomas of the head and neck with irradiation. Am J Clin Oncol 1995;18:389—91. DOI : 10.1097/00000421-199510000-00005
8. Kim JA, Elkon D, Lim ML, Constable WC. Optimum dose of radiotherapy for chemodectomas of the middle ear. Int J Radiat Oncol Biol Phys 1980;6:815—9.DOI : 10.1016/0360-3016(80)90317-X
9. Hu K, Persky MS. The multidisciplinary management of paragangliomas of the head and neck, part 2. Oncology 2003;17:1143—53.
10. Hatfield PM, James AE, Schulz MD. Chemodectomas of the glo mus jugulare. Cancer 1972;30:1164—8. DOI : 10.1002/1097-0142(197211)30:5<1164::aid-cncr2820300505>3.0.co;2-z
11. Powell S, Peters N, Harmer C. Chemodectoma of the head and neck: results of treatment in 84 patients. Int J Radiat Oncol Biol Phys 1992;22:919—24. DOI: 10.1016/0360-3016(92)90788-j
12. Pryzant RM, Chou JL, Easley JD. Twenty-year expe rience radiation therapy for temporal bone chemodectomas. Int J Radiat Oncol Biol Phys 1989;17:1303—7.DOI: 10.1016/0360-3016(89)90541-5
13. Krych AJ, Foote RL, Brown PD, et al. Long-term results of irradiation for paraganglioma. Int J Radiat Oncol Biol Phys 2006;65:1063–6.DOI: 10.1016/j.ijrobp.2006.02.020
14. Wang ML, Hussey DH, Doornbos JF, et al. Chemodectoma of the temporal bone: a comparison of surgical and radiotherapeutic results. Int J Radiat Oncol Biol Phys 1988;14:643–8.DOI :10.1016/0360-3016(88)90084-3
15. Tran Ba Huy P, Chao PZ, Benmansour F, et al. Long-term oncological results in 47 cases of jugular paraganglioma surgery with special emphasis on the facial nerve issue. J Laryngol Otol 2001;115:981–7.DOI: 10.1258/0022215011909819
16. Suarez C, Rodrigo JP, Bödeker CC, et al. Jugular and vagal paragangliomas: systematic study of management with surgery and radiotherapy. Head Neck 2013;35:1195–204DOI : 10.1002/hed.22976