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The role of radiotherapy in non-surgical pineocytoma: A case report

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Abstract

Pineal parenchymal tumors are so rare that their responses to radiation and/or chemotherapy are not well known. A case of pineocytoma, which responded well to radiation therapy is reported. A 35-year-old male received radiation therapy in a total dose of 50.4 Gy to the tumor. Six months after the completion of therapy, CT SCAN showed a regression of tumor size and he remains well as of 11 months after treatment.

Keywords

Brain; Pineocytoma; Radiotherapy.

Introduction

Pineal region tumors are rare brain tumors. They affect all ages but are more common in children [1,2].

Pineal region tumors are a heterogeneous group of lesions that includes several histological varieties: Tumor types occurring in the pineal region may or may not involve the pineal gland. Tumors that may occur in this region but are not necessarily pineal tumors include: germinoma, non-germinoma (eg, teratoma, endodermal sinus tumor, embryonal cell tumor, choriocarcinoma, and mixed tumors), meningioma, astrocytoma, ganglioglioma, and dermoid cysts. True pineal cell tumors-pineocytoma, pineoblastoma, and mixed pineal tumors are the main ones.

The management of pineal region tumors is a multidisciplinary management model, for little is known about their clinical behavior, and optimum treatment is not yet defined [3].

Case Report

A 35 years old man was admitted to the ER for increased intracranial pressure syndrome. The diagnosis of pineocytoma was retained after performing a radiological (CT+MRI) and anatomopathological (Biopsy) assessment.

In the presence of a marked obstructive hydrocephalus, V-P shunting was performed and resulted in relief of all symptoms. After being assessed by neurosurgeons, surgical resection was deemed not feasible because of the tumor's proximity to the brainstem, and the patient was sent to our department for additional management. The file was discussed collegially and exclusive radiotherapy was indicated.

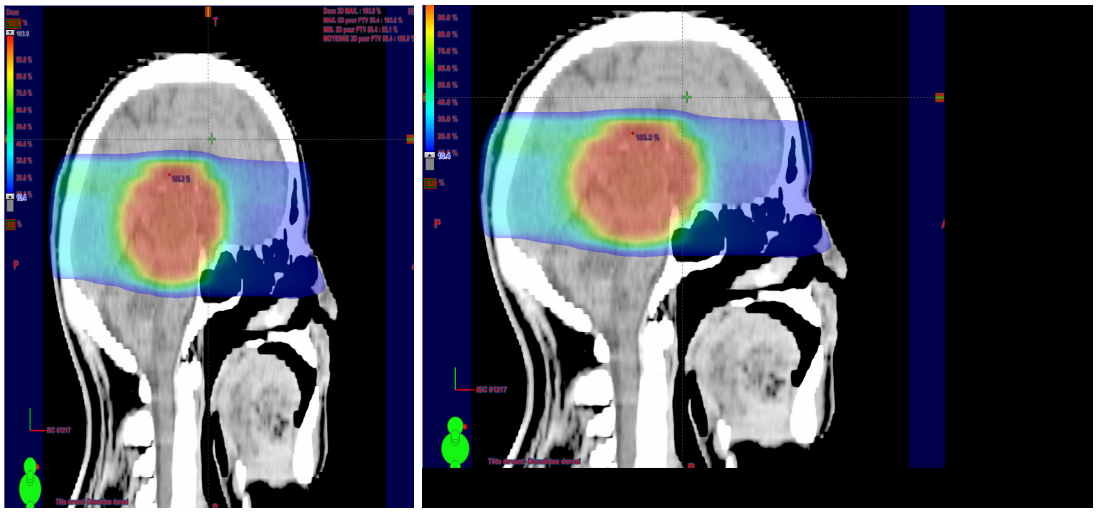
The technique used is that of Intensity Modulated Radiotherapy (IMRT) at the total dose of 50.4 Gy in conventional fractionation (1.8 Gy/Fr). Our patient received his complete treatment regimen (End of treatment on 20/01/2022) with good overall tolerance.

After treatment, the patient returned to work and did not present any functional complaints. His control imaging performed six months after the end of treatment shows a regression in tumor size centered on the pineal region as well as a regression of hydrocephalus.

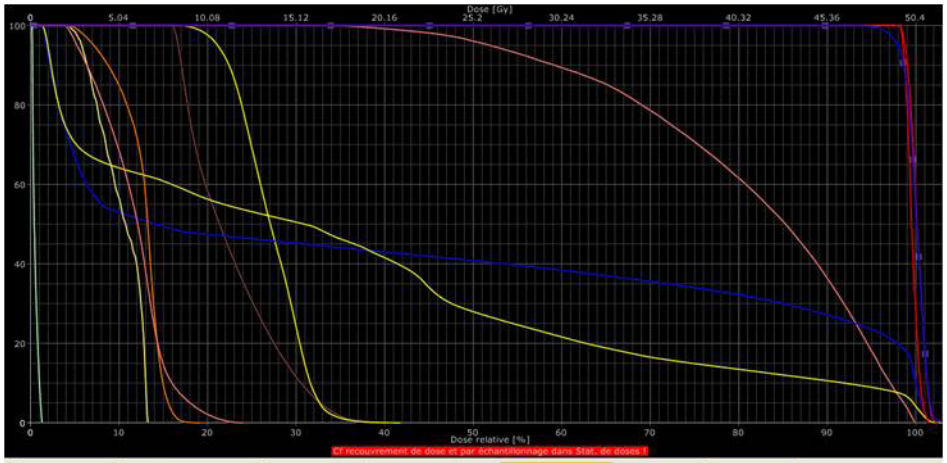
Discussion

Pineal tumors account for 0.5% to 1% of adult intracranial tumors in Europe and the United States [4,5]. Pineal tumors, are divided into germ cell tumors, pineal parenchymal tumors and tumors that derive from adjacent structures. Only 14–30% of these tumors are of pineal parenchymal origin, the majority being germ cell tumors [6,7].

There are three types of pineal parenchymal tumors. **Pineocytoma:** Slow-growing, grade II tumor. **Pineoblastoma:** More aggressive, grade IV, malignant (cancerous) tumor. A grade III intermediate form has also been described. **Mixed Pineal Tumor:** Contains a combination of cell types.



Figures 1 & 2: Dose distribution.



Prescription de dose | Alignement des champs | Objectifs du plan | Objectifs d'optimisation | Statistiques de doses | Modèles de calcul | Somme de plans

Ligne de HDV	Structure	État d'approbation	Plan	Dossier de trait...	Volume [cm³]	Recouv. Dose[%]	Recouv. Échanti...	Dose min. [%]	Dose max. [%]	Dose moyenne [...
	Chiasma optique	Approuvée	Pinealocytome	IMRT	1.8	100.0	99.8	31.8	100.0	81.4
	Cris D	Approuvée	Pinealocytome	IMRT	0.4	100.0	101.7	4.3	13.3	10.2
	Encéphale	Approuvée	Pinealocytome	IMRT	1259.6	100.0	100.0	1.2	103.9	35.1
	OTV	Approuvée	Pinealocytome	IMRT	19.4	100.0	100.0	97.9	101.7	99.6
	ME	Approuvée	Pinealocytome	IMRT	7.8	100.0	100.1	0.1	1.3	0.5
	NF Optique Dt	Approuvée	Pinealocytome	IMRT	1.3	100.0	100.6	15.9	40.2	22.6
	Nf optique Gch	Approuvée	Pinealocytome	IMRT	1.1	100.0	100.2	16.8	41.8	27.1
	Oeil D	Approuvée	Pinealocytome	IMRT	9.7	100.0	100.0	4.3	19.3	12.6
	Oeil G	Approuvée	Pinealocytome	IMRT	8.6	100.0	99.9	3.9	24.0	11.7
	PTV 50.4	Approuvée	Pinealocytome	IMRT	93.6	100.0	100.0	92.1	103.9	100.0
	TC	Approuvée	Pinealocytome	IMRT	23.8	99.9	100.2	1.4	101.7	41.8

Figure 3: DVH; Dose to organs at risk.

Pineocytomas are benign tumors diagnosed by brain Magnetic Resonance Imaging (MRI).

The usual presentation of PRTs is the symptoms of obstructive hydrocephalus and intracranial hypertension [3].

The most powerful diagnostic tools are magnetic resonance imaging and computed tomography. MRI is a decisive method for determining the most appropriate surgical approach angle. On MRI, pineocytomas appear as hyperintense, round or lobular masses [8].

Histopathological evaluation of the tumor is essential for diagnosis [9,10].

The management of tumors in the pineal region remains discussed but currently benefits from a systematic reflection in multidisciplinary consultation meetings.

When feasible, removal of the tumor is the basis for the treatment of pineocytomas. In case of complete removal, additional treatment is not necessary [11]. Surgical resection can optionally be followed by conventional radiotherapy or gamma-knife radiosurgery [13-16]. The optimal adjuvant therapy protocol however, is still not defined.

Some parenchymal-cell tumors, however, tend to invade surrounding cerebral structures and have a high risk of spinal dissemination. Commonly, these tumors cannot be totally resected, so other therapeutic attitudes should be discussed with the patient, by the patient's healthcare team based on the patient's age, remaining tumor after surgery, tumor type, and tumor location (Monitoring, Radiosurgery, Radiotherapy).

Herrick et al. observed some years ago that pineocytomas with biological evidence of slow growth are differentiating tumors that would not be expected to be radiosensitive, and therefore maximal surgical

removal is the treatment of choice in these cases [12].

On the other hand, the clinical behavior of pineal parenchymal tumors has not been well defined. Our case of pineocytoma did respond to radiotherapy and is doing well.

Before the development of contemporary microsurgical techniques, most authors advocated surgical conservatism because of high operative mortality and morbidity. This strategy usually involved ventricular shunting followed by fractionated radiation therapy, which allowed an overall mortality of less then 5%, and a 5-year survival rate of 60 to 75% [11,17-20]. Since surgery was not feasible and our patient showed unwillingness to adhere to observation alone, this is the strategy we tried to implement in order to increase his survival rate. Katsuaki et al also reported the case of a 45-year-old female with pineocytoma who received radiation therapy in a total dose of 5000 rads to the tumor and showed complete disappearance of the tumor [21].

Conclusion

Pineal region tumors are a heterogeneous, uncommon group of brain tissue lesions that are deeply embedded under the cerebral hemispheres behind the third ventricle and brainstem. Therefore, these tumors can sometimes not be totally resected or not resected at all.

Our case illustrates that radiation therapy can be an acceptable alternative for surgery for non-surgical pineocytomas. Further studies with greater sampling would be interesting to validate this therapeutic option.

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