Spinal Intramedullary Glioblastoma in a Patient Previously Irradiated for Childhood Head and Neck Embryonal Rhabdomysarcoma: Case report and Review of the Literature

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ABSTRACT

Spinal intramedullary glioblastoma localized in cervical spinal tract has rarely been reported in the literature. The most characteristic features are a rapid clinical and radiographic progression and a very poor prognosis. We report a case of a 37-year old man with a diagnosis of cervical spinal intramedullary glioblastoma, with a previous oncological history of a childhood head and neck (epypharyngeal) embryonal rabdomyosarcoma, treated with chemo-radiation therapy in our Department in 1982. The current presentation was with paresthesias/dysethesias on the left side without motor weakness; a brain and spinal MRI showed a contrast enhancing intramedullary lesion at the C2-C5 level, but no evidence of intra-cerebral disease. Biopsy of the intramedullary lesion by C2-C5 laminectomy was performed and cytological analysis revealed a glioblastoma. Radiation treatment was planned with a total dose of 54 Gy to be given in 27 fractions; unfortunately clinical deterioration at a total dose of 32 Gy was noted. Patient developed respiratory distress potentially related to the involvement of respiratory centres; patients died two days after the development of respiratory symptoms.
There is little information about cervical spinal intramedullary glioblastoma in the literature and more studies are needed.

Keywords: Spinal Intramedullay Glioblastoma; Paraesthesia; Cervical Spinal Tract

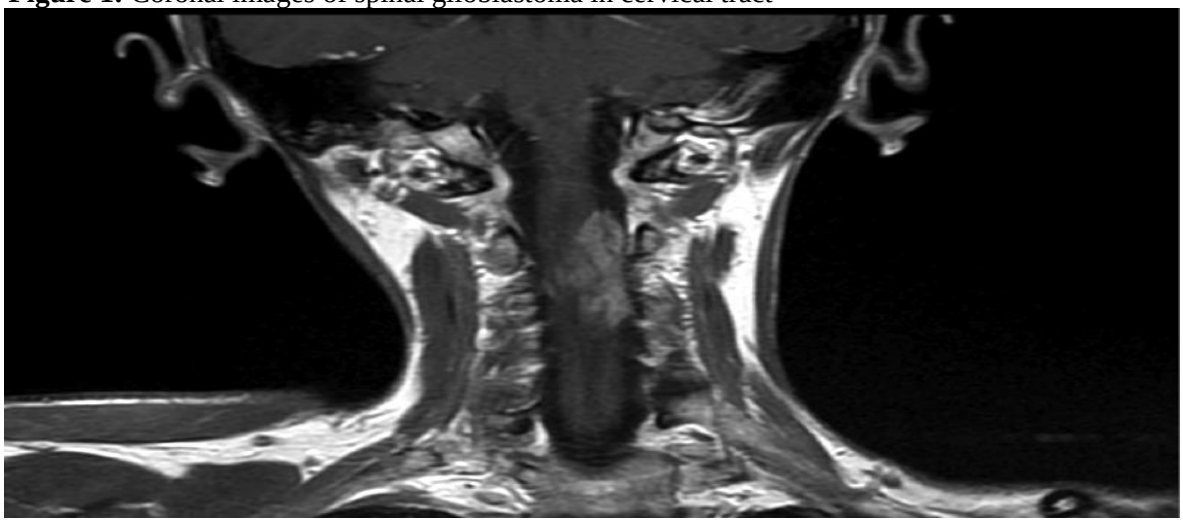
INTRODUCTION

Radiation therapy is a well-known potential carcinogenic treatment and the association of radiation-induced intracranial-spinal tumor has been well documented since 1950. The most frequent radiation induced spinal tumors were meningiomas, followed by gliomas and sarcomas [1]. Spinal glioblastoma (GMB) represents a very rare presentation, accounting for only 1.5% of all spinal cord tumors [2], for the most part astrocytomas, followed by ependymomas [3]. An intra-medullary finding is mostly observable during the second and third decades and involves thoracic region [4]. There are reported cases of cervical spinal GBM [5-6]. We present a case, with a systematic review of the literature, of spinal intramedullary GBM in a patient with an oncological history of head and neck embryonal rabdomyosarcoma, treated with radiotherapy and chemotherapy in 1982 and who was cured from this disease.

CASE REPORT

In September 2011, a 37-year-old man was referred at our department after recent onset of paresthesias/dysethesias on the left side of his body without motor weakness.
He had history of head and neck (epypharyngeal) embryonal rabdomyosarcoma in 1982 at which time patient was successfully treated with surgery, adjuvant radiation therapy with ^{60}Cobalt machine (total dose of 57 Gy/32 fractions; estimated dose to cervical spine and brain stem structure roughly in the range of 40 Gy) and chemotherapy (doxorubicin, cyclophosphamide and vincristine; nine cycles completed in December 1983). To investigate his symptoms at this admission, we performed brain and spinal magnetic resonance imaging (MRI) that showed an intramedullary neoplastic lesion of the

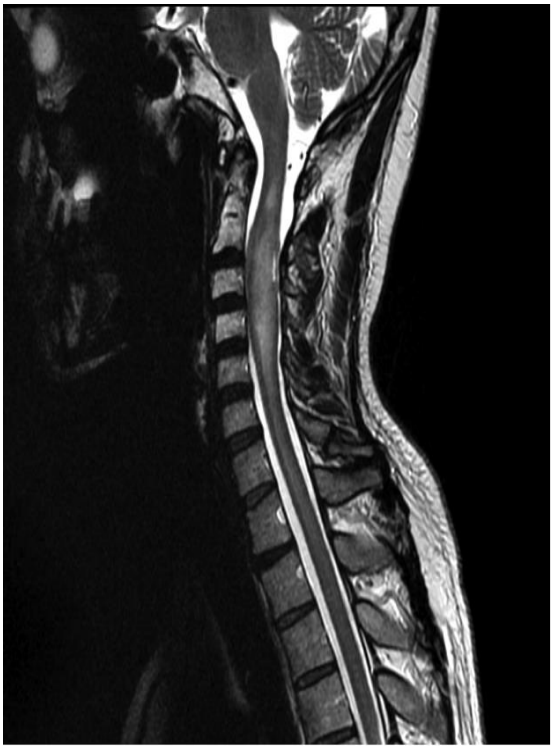
Figure 1: Coronal images of spinal glioblastoma in cervical tract



cervical spinal tract (C2-C5), (Figure 1-2). A thoracic and abdominal computer tomography scan (CT) showed no evidence of disease metastasis and clinical staging was completed with a cerebrospinal fluid analysis (CFS) that was negative for tumor cells. Biopsy of the intramedullary tumor through C2-C5 laminectomy showed it to be a GBM with small cell characteristics and a high level of cellular proliferation (Ki67:70%).

Radiation treatment of the cervical lesion was planned for a total dose of 54 Gy in 27 fractions, despite the fact that the cervical spinal cord as well as medulla oblongata had already received a dose very close to the tolerable one during the previous radiation treatment. Patient was treated during November-December 2011; unfortunately, during the third radiation treatment week, after a total dose of 32 Gy, clinical worsening was observed with respiratory distress, potentially related to the involvement of respiratory centres. Patient died 2 days after the onset respiratory symptoms.

Figure 2: Sagittal images of spinal glioblastoma in cervical tract



SYSTEMATIC REVIEW

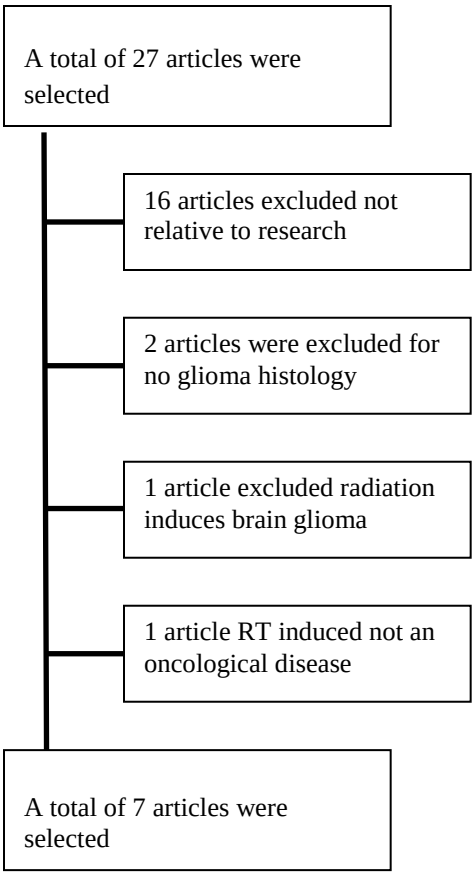
A PubMed search from January 1960 to January 2013 was performed to include all relevant studies using the combination of the term radio-induced brain tumors, radiotherapy and spinal intramedullary glioma. We identified 27 studies of which 8 fulfilled our inclusion criteria and were considered in our systematic review (Table 1).

DISCUSSION

Cahan and colleagues had defined some signs to identify a radiation-induced tumor; there must be a latency time between irradiation and tumor development, tumor must arise in the irradiated area and must have a different histology than the primary and finally no immunodeficiency conditions must exist [7]. Our reported case met all of these criteria.

Evidence of radiation-induced glioma in the spinal cord is only circumstantial as very few cases have been documented and including our

Table 1 Systematic Research results



case a total of 9 cases were reported in the literature.

In 4 cases, spinal glioma were related to Hodgkin disease [8-11], in 1 case to thyroid cancer [12], one case to medulloblastoma [13], one to pulmonary tuberculosis [14], and one to radbomyosarcoma [15].

In the majority of cases radiation-induced high-grade glioma were associated with a previous radiation treatment for Hodgkin's lymphoma and in all patients radiation treatment was completed before 30 years of age. All patients were treated with a previous radiation dose greater than 30 Gy with a range of 30-52 Gy; only in one case radiation dose was not reported [14].

In literature, the range latency period in radiation-induced brain gliomas is 9.2 to 16 years [16] and in our case report the latency period was 29 years. Spinal GBM have a very poor prognosis and an aggressive multimodal therapy is recommended [17]. There are no standard guidelines and limited international experiences are available. An aggressive surgery is not possible due to the absence of a cleavage plan between tumor and spinal cord leading to a serious neurologic sequela in case of extensive tumor resection [3]. Radiation therapy represents the most important therapeutic option and in most cases the only therapy. Wook-Ha Kim and colleagues [18] evaluated the role of chemotherapy in this subgroup of patients. Unfortunately, small samples, and the use of different chemotherapy regimens and therapeutic modalities (concomitant or adjuvant chemotherapy) do not allow firm conclusion.

In our patient, radiation therapy alone was performed and previous spinal irradiation was not considered a contraindication for radical radiation treatment because in our opinion the theoretical advantage of tumor control counteracted the probability of developing a radiation induced myelopathy.

CONCLUSION

In our opinion an aggressive treatment, represented by radical radiation therapy alone or combined with temozolomide chemotherapy may be recommended in highly selected patients; however clinical studies are needed to standardize the treatment of spinal high-grade glioma.

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Table 2: Summary of Radiation-Induced Spinal Cord Tumors

Authors	Publication	Age RT	Primary Disease	RT	Latency	Tumor Type
Clifton	1980	21	Hodgkin disease	50	6	Glioblastoma
Steinbok	1980	20-23	Pulmonary tuberculosis	N.D	25	Low grade astrocytoma
Marus	1986	19	Thyroid cancer	45-55	23	Anaplastic astrocytoma
Bazan	1990	19	Hodgkin disease	40	7	Astrocytoma Grade II-III
Grabb	1996	3	Medullomyoblastoma	30	17	Anaplastic astrocytoma
Riffaud	2006	30	Hodgkin disease	40	9	Anaplastic glioma
Ng	2007	23	Hodgkin disease	30.6	3	Glioblastoma
Anh	2010	4	Rhabdomyosarcoma	45	13	Glioblastoma
Our case	2011	8	Rhabdomyosarcoma	57	29	Glioblastoma

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