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Cognitive Disorders and Pediatric Medulloblastoma: About a Case

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ABSTRACT

Medulloblastoma is one of the most common type of pediatric brain cancer, it is a primary neuroectodermal tumor located in the cerebellum and 4th ventricle. The treatment is based on surgery, chemotherapy and radiotherapy. The survival rate of children treated for this brain tumor has improved significantly in recent years thanks to the progress of various therapies. The neurocognitive sequelae secondary to the occurrence of a medulloblastoma have been the subject of numerous studies.We report the case of a 12-year-old boy with medulloblastoma of the posterior fossa, he underwent surgery and received radiotherapy and chemotherapy. Subsequently, he began to present school difficulties and memory disorders for this reason his pediatrician sent us for management.

Introduction

Medulloblastoma is one of the most common type of pediatric brain cancer, it is a primary neuroectodermal tumor located in the cerebellum and 4th ventricle. It is mainly a pediatric tumor since it develops in 80% among children. It is the main primary malignant pediatric brain tumor (1). The median age at diagnosis is 6-7 years (2). There is a male preponderance with a sex ratio of about 1.5 (3).

The management of medulloblastoma is multidisciplinary and involves several disciplines including radiology, neurosurgery, pathology, radiotherapy and chemotherapy. The five-year survival rate is now excellent, and it is about 80% at all stages. Unfortunately, these results are fraught with serious sequelae, essentially neurocognitive, well documented in the child whose brain is being organized at the time of irradiation.

The therapeutic strategy must therefore take into account the long-term sequelae and it must be decided in multidisciplinary consultation meetings.

We present the case of a child who has been treated for medulloblastoma of the posterior fossa and who was referred by his attending physician to the psychiatric consultation for management of cognitive disorders and school failure.

Clinical case

He is M.M a 12-year-old child, he has been socialized since the age of 2 in a nursery school then at 7-year-old in a primary school, and he is currently in CE4, with no particular pathological background.

The patient comes from a family of low socio-economic level, his father is a security guard and his mother is a housewife; he is the eldest of three siblings. The pregnancy went well, but the delivery was premature at 28 weeks; subsequently the psychomotor development is considered normal.

At the age of 8, M.M began to develop persistent headaches that were resistant to medical treatment, and vomiting appeared after 3 months, a brain MRI was performed showing a medulloblastoma. He underwent a surgical excision, and a postoperative ventriculoperitoneal shunt was placed. Postoperative MRI showed the persistence of a tumor residue of 50x50 mm without secondary medullary localization. M.M subsequently received 19 sessions of radiotherapy, 36 Gy on all neuropathy then 18 Gy on the posterior fossa and the tumor residue. He subsequently received 6 courses of chemotherapy.

The patient subsequently resumed his studies after making a year off due to hospitalizations and treatment; and this is where his parents and teachers have noticed that M.M has school difficulties and memory disorders for this reason his pediatrician sent him to us for management.

We saw the patient who was calm, the contact with him was easy, he has no behavioral disorders or depressive or anxiety disorders, but he presents cognitive disorders, difficulties of concentration and attention, anterograde amnesia and mathematics problems. A neuropsychological assessment was requested. A cognitive remediation is necessary with a school adaptation.

Discussion

Currently, the long term survival is increasing, reaching up to 85% in standard risk medulloblastoma. Attention is therefore increasingly focused on the sequelae and the survivors' life quality, in order to better adapt the therapeutic decisions.

All studies suggest that cognition is the most frequently affected factor in the long term. [4]

The neurocognitive effects relate primarily to the new knowledge learning rather than the loss of knowledge and abilities previously mastered by the child. Attention disorders and the ability to concentrate are mainly observed, resulting memory problems, mainly related to working memory, as well as an overall slowdown in the comprehension and integration of information [5].

These learning disabilities result a decrease in school performance that can lead to school failure and the need for teaching in a specialized environment (in 25 to 50% of cases according to the studies) [5,6, 7], as well as difficulties of social and professional integration [7]. Moreover, even in patients who have no "measurable" cognitive sequelae by the

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means described above, we observe difficulties in living with a partner and creating a family [4].

The main risk factors for these sequelae are: young age at diagnosis [5], intracranial hypertension at diagnosis and the delay in the management [4], the occurrence of surgical trauma that may have resulted cerebellar lesions.

Radiation therapy, especially craniospinal radiotherapy, radiotherapy, is a very unfavorable factor, especially since the total dose and the irradiated brain volume were significant [8, 9, 10]

In a study by Hoppe-Hirsh et al, they demonstrated that irradiation modalities could have an impact on the degree of executive function disorders and intelligence quotient. (11)

Adjuvant chemotherapy is also a pejorative factor in the occurrence of sequelae, although this is discussed in studies [5].

It should be noted, finally, that the decline of cognitive functions is a dynamic and evolving phenomenon that continues for several years (on average 5 to 10 years) after the end of treatment [12]. Considering the evolution of deficits, it is essential to assess early and repeatedly the disease impact and the treatment on cognition in order to detect these sequelae and to implement an appropriate management.

The parental and school environment and the management quality of these sequelae can influence the evolution of cognitive disorders.

The early management of children treated for a brain tumor is a subject that is being studied more and more. It mainly concerns cognitive remediation and in particular the management of disorders of executive, attentional and working memory functions, rehabilitation but also the possibility of reorganization at the cortical level. (8)

Ping Zou's study showed a cohort of 14 children cured of cancer, after a cognitive remediation program, a possible reorganization of the cortical areas that underlie these functions but also a better activation of injured brain areas. This improvement tends to extend beyond six months after the rehabilitation program. (13)

Butler's study on 161 children treated for brain tumors who had a major attention deficit showed that after a specific cognitive remediation program children had fewer attention disorders (neuropsychological tests and developmental scales) (14)

Conclusion

To date there is no ideal, rapid and reproducible tool to better assess the cognitive sequelae of children under treatment for medulloblastoma. The involvement of psychiatrists, child psychiatrists, neuropsychologists and / or speech therapists must be systematic. It is also necessary to point out the primordial place of cognitive remediation in the management of these disorders.

Treatments improvement and the early management of sequelae may eventually help to limit these sequelae and promote the socio-professional integration of these patients.

Conflicts of interest

The authors declare no conflict of interest.

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