Anaplastic Craniopharyngioma

Malignant or anaplastic craniopharyngioma, first described in 1987 by Akachi and coworkers [1] , is a rare occurring craniopharyngioma characterized by cytologic atypia and poor prognosis.

Epidemiology

Sofela et al., conducted in 2014 conducted a PUBMED, SCOPUS, OVID SP, and INFORMA search with a combination of key words: craniopharyngioma, malignancy, transformation, neoplasm, radiation therapy, and anaplastic. They identified 23 cases relevant to our study.

Median age at the time of diagnosis of malignant craniopharyngiomas was 31 years (range, 10-66 years); 52.6% of the patients were female. Histologically, the most common tumor types were squamous cell carcinoma (80.96%), with adamantinomatous cell type being the most common morphology (89.47%).

Sofela et al., found that 21.7% of the cases were diagnosed as malignant craniopharyngioma at first biopsy. Of the rest, the median time from initial benign diagnosis to MT was 8.5 years (range, 3-55 years). Median overall survival after MT was 6 months (range, 2 weeks-5 years). Using the Spearman rank correlation, we found no correlation between the use of radiation therapy (correlation coefficient, -0.25; $P < .05$) or its dosage (correlation coefficient, -0.26; $P < .05$) and MT [2].

Pathogenesis

The exact cause and pathogenesis of this MT are unknown, although the literature has suggested a possible correlation with radiotherapy [3].

Radiation therapy and p53 mutations could be involved in malignant transformation in craniopharyngioma [4].

Histology

It assumes varied histologic appearances, usually after multiple recurrences and radiation therapy, and has a near uniformly fatal outcome. De novo malignancy in odontogenic tumors of the sella is even more unusual, but also has an ominous prognosis [5].

Outcome

Malignant craniopharyngiomas are associated with a poor prognosis. MTs occur years after the initial benign craniopharyngioma diagnosis and are associated with multiple benign craniopharyngioma recurrence. Results also show that, contrary to widespread belief, there is a poor correlation between radiotherapy and MT [6].

Case reports

Nomura et al., presents the first case of malignant craniopharyngioma reactive to adjunctive Gamma knife stereotactic radiosurgery and chemotherapy. Malignant craniopharyngioma is very rare, and they report Gamma knife stereotactic radiosurgery and chemotherapy (Carboplatine and etoposide chemotherapy), as well as Temozolomide chemotherapy were effective and could control progression of the tumor temporarily. Since adjunctive Gamma knife stereotactic radiosurgery and chemotherapy of malignant craniopharyngioma cases affects follow-up strategies, they propose supporting the need to a revision to the WHO classification regarding malignancy evaluation of craniopharyngioma [7].

2017

Jeong et al., report the case of a 26-year-old male patient who underwent suprasellar mass excision via an interhemispheric transcallosal approach. Histopathological examination indicated that the craniopharyngioma was of the adamantinomatous subtype. The patient received postoperative medical treatment for endocrine dysfunction and diabetes mellitus without radiation treatment. Two years after the operation, he presented with progressive visual disturbance and altered mentality. Magnetic resonance imaging revealed a huge mass in the suprasellar cistern and third ventricle. He underwent a second operation via the same approach. The histopathological examination showed an adamantinomatous craniopharyngioma with sheets of solid proliferation in a spindled pattern, indicating malignant transformation [8].

2015

A 29-year-old male patient was admitted into hospital with the main complaint of progressive visual disturbance. Both CT SCAN and MRI demonstrated a cystic-solid contrast-enhancing sellar-suprasellar mass with obvious calcification. Histopathological examination of the first resected specimen showed a typical appearance of adamantinomatous craniopharyngioma. The patient received gamma knife therapy after his first operation because of partial tumor removal. He experienced two relapses in the subsequent 2 years, for which only surgical resection was performed. The later histopathology presented malignant appearance with tumor cells moderate to severe pleomorphism, hyperchromasia, increased nuclear cytoplastic ratio, high mitotic activity (30/10 high power fields) and focal coagulative necrosis. The patient died 9 months after identification of histologic malignancy. Clinical and histopathological features, biological behavior of one case of malignant craniopharyngioma were discussed, with a brief review of the relevant literature [9].

2014

Malignant transformation of craniopharyngioma in an infradiaphragmatic case [10].

2011

A 66-year-old female who presented with visual disturbance and radiological evidence of a sellar and suprasellar tumor. The patient underwent transsphenoidal biopsy followed by pterional craniotomy

with partial tumor removal. Histological diagnosis documented a malignant adamantinomatous type craniopharyngioma. The patient received adjuvant radiotherapy with a significant tumor reduction. She remained in good clinical conditions for 10 months; she deteriorated and died, due to tumor progression, 15 months after diagnosis.

This is the first case of de novo malignant craniopharyngioma with significant follow-up [11)].

Gao et al., report a case of ameloblastic carcinoma arising from a previously benign craniopharyngioma in a 42-year-old woman. The patient was diagnosed with craniopharyngioma in August 2004 and underwent surgical resection of a typical craniopharyngioma, the pathological result was craniopharyngioma, papillary and adamantinomatous types. During the subsequent 5 years, this patient experienced two recurrences, for which surgical resections were performed without radiotherapy. The last two pathologic diagnoses were malignant craniopharyngiomas and there was more apparent sign of malignancy in the third pathologic section [12)].

2010

Aquilina et al., describe 2 additional pediatric cases. Treatment in both of these cases consisted of multiple resections and external beam radiation therapy (EBRT). Malignant transformation occurred 7 and 8 years after EBRT. The authors also review another 6 cases in adults. A possible causative association with radiation therapy is discussed. As radiation is currently an important option in the management of craniopharyngiomas, this association requires further study [13)].

A 32-year-old man presented with malignant craniopharyngioma associated with moyamoya syndrome manifesting as right visual disturbance. Magnetic resonance (MR) imaging revealed a parasellar mass lesion diagnosed as adamantinomatous craniopharyngioma. He underwent three surgical procedures and repeated courses of radiotherapy, and was able to resume his daily life. MR imaging demonstrated tumor regrowth and bilateral occlusions of the internal carotid arteries (ICAs) with basal moyamoya phenomenon, which might have been induced by irradiation and/or tumor compression, 10 years after the initial manifestations. Sufficient debulking was safely achieved via the transsphenoidal route and histological examination revealed squamous cell carcinoma, indicating malignant transformation of craniopharyngioma. The tumor relapsed after only one month, so transsphenoidal tumor debulking was tried again. However, the postoperative course was unfavorable because of intraoperative bleeding from the right ICA. Malignant transformation of craniopharyngioma may be included in moyamoya syndrome. The treatment strategy should be carefully considered in such a complicated situation [14)].

Ishida et al.,report a case of malignant transformation in craniopharyngioma after radiation therapy.

Histopathological and immunohistochemical analyses were carried out for specimens of the suprasellar tumor (from three resections, with the third surgery performed after radiation therapy).

The resected tumors from the first and second surgeries comprised islands of loosely cohesive aggregates of epithelial cells, so-called stellate reticulum. At the periphery of the nests, palisaded

columnar epithelium was observed. Wet keratins were scattered, and few mitotic figures were seen. The third surgical specimen was composed of irregular large nests of basaloid cells that had large, round to oval nuclei with prominent nucleoli, and mitotic figures were frequently seen (21/10 high power fields). In the center of the nests, eosinophilic ghost cells, resembling wet keratin, were observed. Accordingly, the diagnosis of malignant transformation in craniopharyngioma was made. Immunohistochemical studies revealed that the p53 protein was over-expressed in the malignant component, whereas its expression was much lower in the benign component.

Similar to the ten previously reported cases of malignant transformation in craniopharyngioma, the present case occurred after radiation therapy. p53 protein overexpression was also observed in the earlier cases of malignant craniopharyngioma as well as in the present case (6/6 cases). They concluded that radiation therapy and p53 mutations could be involved in malignant transformation in craniopharyngioma [15)].

2009

A case of malignant craniopharyngioma in a 46-year-old woman presenting clinically with visual disturbance and bifrontal headache is reported. Histopathologic examination of the suprasellar mass showed a lesion characterized by nests of epithelial cells with a basaloid appearance, round-to-oval nuclei, moderate pleomorphism, hyperchromasia, increased nuclear cytoplastic ratio and high mitotic activity. Immunohistochemically, the tumor cells were positive for Ki-67 (44.3%), p53 (98%), and p63 (100%), but negative for estrogen and progesterone receptors [16)].

2007

Rodriguez et al., report 3 patients with craniopharyngiomas exhibiting histologic malignancy, 2 of which received radiation therapy before its appearance. Hematoxylin and eosin-stained slides and selected immunohistochemical stains were reviewed in all cases. Microvessel density analysis was performed in case 2. The patients included 2 men and 1 woman, age 14, 31, and 58 years at presentation, respectively. All patients expired 3 months to 9 years after first resection and 3 to 9 months after identification of histologic malignancy. The latter developed after multiple recurrences and radiation therapy in 2 cases, but seemed to arise de novo in 1 case resembling odontogenic ghost cell carcinoma and lacking any definite low-grade craniopharyngioma precursor. The malignant component of the other 2 cases resembled squamous cell carcinoma and low-grade myoepithelial carcinoma, respectively. The MIB-1 labeling index was markedly increased in the malignant component in comparison with the low-grade precursor [17)].

2006

Malignant transformation of craniopharyngioma: a case report [18)].

2004

A 21-year-old woman, who developed a malignant tumour arising from a craniopharyngioma 14 years after the original diagnosis. The remarkable response of this malignant tumour ex-craniopharyngioma

to cis-platin based chemotherapy, together with other midline tumour characteristics of craniopharyngioma, raise the question as to whether craniopharyngioma should any longer be separately considered from suprasellar germ cell tumour [19].

2000

Kristopaitis et al., describe a case of squamous cell carcinoma arising in a previously benign craniopharyngioma in a 42-year-old woman. The patient was diagnosed with craniopharyngioma in 1982; during the subsequent 15 years she experienced 7 tumor recurrences, for which surgical resections and 3 courses of radiotherapy were performed. In 1998, the tumor recurred with involvement of the nasal cavity and sphenoid and ethmoid sinuses. Histologic evaluation revealed foci of typical adamantinomatous craniopharyngioma associated with a moderately differentiated squamous cell carcinoma. The transition of typical craniopharyngioma to squamous cell carcinoma was well demonstrated, suggesting that carcinoma arose from the underlying craniopharyngioma. Radiation may have been a contributing factor to carcinogenesis in this case [20].

1999

Virik et al., report a further case of malignant transformation in recurrent craniopharyngioma following radiotherapy [21].

1989

Two cases of a craniopharyngioma with malignant transformation are reported. Case 1 involved a 3-year-old male who had received a partial resection and radiotherapy for a suprasellar tumor. Histologically, a biopsy specimen showed craniopharyngioma. Eight years later, the child died of an intracerebral and nasopharyngeal invasion of the recurrent tumor. Case 2 involved a 9-year-old male who initially had been diagnosed as having a craniopharyngioma in the suprasellar region. Five years after the first operation, he died from growth of the tumor in spite of radiotherapy and a partial resection. The pathological examinations of these two cases showed an apparent transition of the craniopharyngioma into a squamous cell carcinoma [22].

1988

A 49-year-old woman presented with recurrence of a suprasellar craniopharyngioma diagnosed 35 years previously. The patient had been treated surgically for recurrence on five occasions. Radiation therapy had been administered 7 years before the final presentation. Tissue obtained from the fifth operation revealed malignant degeneration in a typical craniopharyngioma [23].

1987

Akachi et al., report a rare case of a 10-year-old girl with craniopharyngioma which showed malignant change after the first operation and irradiation. In June 1981, the patient complained of headache, nausea and vomiting. CT revealed obstructive hydrocephalus due to the calcified mass lesion which

extended to the third ventricle. In order to alleviate the high intracranial pressure, the right ventriculo-peritoneal shunt was first settled and after that, partial removal of the tumor was performed. The pathological diagnosis of the specimen was typical adamantinomatous type of craniopharyngioma without any findings of malignancy. After this operation irradiation was performed. The tumor almost disappeared and the patient was discharged from the hospital and went to school, showing some signs of panhypopituitarism. In May 1984, she complained of decreased left visual acuity, right temporal anopsia, headache, nausea and vomiting. CT revealed recurrence of the tumor which obstract the foramen of Monro bilaterally. As an emergency measure, the left ventriculo-peritoneal shunt was added and the state of the patient became recovered. In order to improve decreased visual acuity, the tumor located around the optic nerves and over the frontal base was removed in June 1984, resulting in partial improvement of visual acuity bilaterally. The pathological examination of the second specimen showed, in addition to the part of adamantinomatous type of craniopharyngioma which was the same as before, the existence of thick layer of stratified large atypical cells which partially covered the cyst wall and partially invaded into the surrounding tissues. The pathological diagnosis was poorly differentiated squamous cell carcinoma with craniopharyngioma of 'adamantinoma' type [24].

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