A novel case of quartet tumor: meningioma, angiomyolipoma, ependymoma and sarcoma: report of a case and review of the literature

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INTRODUCTION

The phenomenon of multiple primary neoplasms in the same individual was described firstly by Warren and Gates (1). Recently, the early detection and the advances in therapy for malignant diseases have contributed to prolonged survival of patients, resulting in an increment of multiple primary tumors. However, the reports of multiple primary tumors are still uncommon. They appear more frequently in the upper digestive tract, respiratory system, head and neck region, or urogenital system. The incidence ranges from 2% to 10% (2). Among those with multiple primary malignancies, double cancers is commonly seen, while triple cancers occur in 0.5% of patients, and quadruple or quintuple cancers occur in only less than 0.1% of the population (3). Autopsy series have estimated the incidence of a second primary cancer ranges from 3% to 7% with the higher percentage representing the older age groups (4-5). Herein we report a case with four primary tumors, all involving different organ systems.

CASE REPORT

A 59-year-old woman admitted to the hospital, with a complaint of progressive weakness on her lower extremities over a 6-month history in January 2011. She denied tobacco usage or alcohol consumption. She was a housewife living in a small village. There was no family history. The patient had a past history of meningioma. The mass located in the right parieto-occipital region 2.5×2×1.5 cm in size, the first of her cancers. It was curatively resected in November
2004. Pathological examination revealed that the tumor characterized was due to the formation of multiple, discrete, concentrically laminated, calcareous bodies (psammoma bodies). It was diagnosed as psammomatous meningioma, grade I (WHO, 2000) (figure 1). In 2010 she admitted to the hospital with left flank pain which was increased progressively within 3 months. The physical examination was unremarkable. Ultrasound demonstrated a hyperechoic mass on the left kidney. The CT revealed a heterogeneous mass in the left kidney measuring 8×5×3 cm. grossly; the tumor was confined within the renal capsule. A radical left nephrectomy was performed. The major histological components of the tumor were characterized by abnormally thick-walled vessels, mature fat cells, and smooth muscle bundles. Pathologic examination revealed an angiomyolipoma which was her second tumor. The tumor composed of adipose tissue, smooth muscles and blood vessels (figure 2). After surgery the patient refused any further diagnostic work and treatment so she did not go to her routine follow-up until (a year later) the development progressive weakness on her lower extremities.

Neurological examination revealed a bilateral hemiparesis (3/5). Lumbar magnetic resonance imaging (MRI) revealed an intadural and extramedullary mass located in the level of L2-L3. On T1-weighted images, the mass appeared isointense whereas on T2-weighted images, it was hyperintense relative to the normal cord. A subtotal excision of the mass was then performed, which was followed by transient improvement. Histological findings indicated a diagnosis of tanycytic ependymoma grade II (WHO, 2007). The tumor characterized by markedly elongated spindle shaped cells, which were immunopositive for S-100 protein and glial fibrillary acidic protein (figure 3). Since the tumor subtotaly resected, a total dose of 5000 cGy radiotherapy (RT) with 2 Gy/fraction was planned. RT field was defined as the preoperative tumor volume (determined by T1 magnetic resonance imaging (MRI) scan) plus 2
We thought that she might have had a genetic syndrome which was associated with multiple primary tumors. Thus conventional cytogenetic analysis and FISH (fluorescence in situ hybridization) with P53 gene were done. Both cytogenetic analysis and FISH analyses showed a normal karyotype and p53 gene.

During follow-up the patient was admitted to the hospital with shortness of breath and severe cough. A contrast enhanced CT revealed multiple nodules in her lungs, which were identified as metastases. The patient was hospitalized. However, her dyspnea was progressively increased and 15 months after the completion of the last RT, the patient died of respiratory failure.

**DISCUSSION**

Multiple primary tumors in a patient are extremely low conditions but have increase in frequency in recent decades. This may be due to the medical improvements in both diagnostic and therapeutic strategies, which eventually increase the overall survival time of the patients with multiple malignancies. On the other hand, as the age increased, the risk of developing a tumor increases as well. We report a patient who developed four different tumors: a meningioma, angiomyolipoma, tanycytic ependymoma and high grade sarcoma. To best of our knowledge, the present patient is the first case in the English literature, who presented with these four types of tumors.

In reviews of the literature with respect to the multiple primary malignancies, it is interesting that, the Japanese population seems to have higher likelihood of developing multiple malignancies. This may be due to longer life span, gene susceptibility or advancement in the field of the oncology. Table 1 summarizes the reported cases of four or more primary malignancies in the literature during 1981-2011 (6-27). Although the appearance of four and more primary tumors in one patient is not very common, should not be considered as such a rare event. As it is seen in the table, most of the cases were...
reported from Japan. Moreover a case with six metachronous primary malignancies was recently reported by Takada and colleagues from Japan (6). As can be seen from the table 1, the case with four primary tumors same with our case has not been reported previously.

Li Fraumeni syndrome comprises of breast cancer, brain tumors, acute leukemia, soft tissue sarcomas, bone sarcomas, and adrenal cortical carcinoma. It is a rare autosomal dominant hereditary disorder linked to germline mutations of p53 tumor suppressor gene. Although we analyzed constitution of karyotype beside p53 alterations we could not find any genetic changes in our case.

Multiple primary tumors occur more often in elderly patients, as the incidence of tumors increases with age. A family history of cancer and genetic predisposition to cancer may be associated with a risk of multiple neoplasms (7).

### Table 1. The reported cases of four or more primary malignancies in the English literature during 1974-2011.

<table>
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<tr>
<th>Author</th>
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<th>2nd Malignancy</th>
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The present case was 59 years old and there was no relevant family history. The patients described in the current report never used tobacco or alcohol. Additionally she did not receive any chemotherapy or radiotherapy for her first two tumors. There wasn’t any predisposing factor to these four tumors.

Interestingly, her fourth tumor, high grade sarcoma, was developed up to 10 cm within three months of period. When she was receiving RT to her spinal region she was regularly followed–up in every week; however she did not have any mass on the gluteal region. Moreover when she admitted to the hospital three months after her spinal RT, we checked again her planning tomography scans and it was completely normal.

There was no predisposing factor, family history and genetic abnormality in the case we presented. We considered that the multiple primary tumors may not be associated with hereditary syndrome and risk factors including smoking, chemotherapy and radiotherapy. However patients with a diagnosis of either benign or malignant tumor should be followed for the development of subsequent cancers.

Conflict of interest: Declared none

REFERENCES


Yavas et al./ A novel case of quartet tumor

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