Glioma of the Central Nervous System : Factors Affecting the Outcome

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Abstract

Glioma is one of the most common brain tumors but the outcome of treatment is still uncertain. The author conducted this study to find the prognostic factors affecting the outcome. The medical records of 41 patients, diagnosed as having glioma, admitted to the Neurosurgery Division, Prasat Neurological Hospital, between January 1998 and December 1999 were retrospectively reviewed. Gender, age, history of smoking and alcohol drinking, symptoms and signs, CT and MRI findings, underlying pathology, locations of lesions, treatments and outcomes were analysed. There were 20 males and 21 females with ages ranging from 2 to 75 years. The mean age was 39.78 $\pm$ 19.81 years old. The three most common presenting symptoms were headache, motor weakness, and seizures. The predominant location of the tumors was in the cerebral hemisphere. Most low grade astrocytoma show low / iso-density with slight contrast enhanced in CT scan. The patients were divided into two groups according to the outcome, improved and dead. Gender, age, history of smoking and alcohol drinking, location of tumors did not have any effect on the outcome. The factors affecting the outcome of treatment were histological subtypes and types of treatment. There was a statistically significantly better outcome in low grade astrocytoma and tumor removal with irradiation. The overall mortality was 21.95 per cent after two years.

Key word : Brain Tumors, Glioma, Astrocytoma, Prognostic Factors, Outcome

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Glioma is the most common type of primary brain tumor in adults. It is found in all ages, from young to old, both male and female. It is found in almost every location of the central nervous system. It has many histological subtypes, so it has no simple characteristics in imaging both computer tomography (CT scan) and magnetic resonance imaging (MRI). Most gliomas have an

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ill-defined boundary in CT and MRI. Because of its many variations, the outcome of treatment is still uncertain. The author conducted this study to find out the prognostic factors affecting the outcome of treatment.

PATIENTS AND METHOD

The medical records of 41 patients, who were diagnosed as having brain tumors of glioma type, admitted to the Neurosurgery Division, Prasat Neurological Institute, between January 1998 and December 1999 were retrospectively reviewed. Age, sex, symptoms and signs, underlying pathology, locations of lesions, treatments and outcomes were analysed. History of smoking, alcohol drinking as well as CT scan and MRI of the brain were also recorded. Patients with other kinds of tumors were excluded.

RESULTS

Of the 41 patients studied, there were 20 males and 21 females. Their ages ranged from 2 years to 75 years. The mean age was 39.78 $\pm$ 19.81 years. There were only 5 children (aged $\leq$ 15 years). There were 6 patients who had a history of smoking and 12 patients had a history of alcohol drinking. The three most common presenting symptoms were headache, motor weakness and seizures. (Table 1). Almost one half of the patients presented with headache, and more than one third with motor weakness and seizures. The predominant location of the tumors was in the cerebral hemisphere. (Table 2). More than half of the tumors (63.41%) were situated in the cerebral hemisphere. Others were deep seated tumors. Surgical removal or biopsy of the tumors was performed in all patients. Craniotomy or craniectomy with tumor removal was done in 31 patients. Biopsy of the tumors with or without cerebrospinal fluid (CSF) shunting was done in 10 patients. Tumor removal and post-operative irradiation was performed in twenty two patients. Ten patients were treated with irradiation alone. The tissue diagnoses of the tumors were pilocytic astrocytoma in 2 patients, astrocytoma in 18 patients, gemitocytic astrocytoma in 6 patients, anaplastic astrocytoma and glioblastoma multiforme in 15 patients (Table 3). The histological diagnoses were divided into two groups. Group I (low grade astrocytoma) included pilocytic astrocytoma and astrocytoma. Group II (high grade astrocytoma) included gemitocytic astrocytoma, anaplastic astrocytoma, and glioblastoma multiforme. Gemitocytic astrocytoma was classified in group II astrocytoma because of its malignant behaviour. The two groups had almost equal numbers. Most low grade astrocytoma show low/ iso-density with slight contrast enhanced on CT scan, but mixed density with contrast enhanced in high grade astrocytoma. MRI findings were unremarkable in both groups. The outcome of treatment was 32 patients improved but nine died. The overall mortality was 21.95 per cent after two years.

Table 1. Symptoms and signs at first presentation.

Symptoms and signs	Numbers of patients	Percentage
Headache	20	48.78
Motor weakness	15	36.59
Seizure	13	31.71
Papilledema	11	26.83
Impaired vision	7	17.07
Impaired memory	7	17.07
Analgesia	7	17.07
Impaired consciousness	5	12.20
Impaired cerebellar function	4	9.76

Table 2. Tumor location.

Tumor location	Number of patients	Percentage
Cerebral hemisphere	26	63.41
Basal ganglia & thalamus	6	14.63
Corpus callosum	4	9.76
Cerebellum	3	7.32
Suprasellar regions	2	4.88

Table 3. The tissue diagnoses of the tumors.

Histology	Numbers of patients	Percentage
Low grade astrocytoma:	20	48.78
- Pilocytic astrocytoma	2	
- Astrocytoma	18	
High grade astrocytoma:	21	51.22
- Gemitocytic astrocytoma	6	
- Anaplastic astrocytoma and Glioblastoma multiforme	15	

Table 4. Factors affecting outcome.

Factors	Death (N=9)	Improved (N=32)	P value
Gender: Male	4	16	0.768
Age: > 30 years	6	20	0.819
Smoking : yes	3	3	0.072
Alcohol drinking : yes	4	8	0.257
Site: Cerebral hemisphere	4	22	0.181
Histology: Malignant	8	13	0.010
Type of treatment:			0.012
- Tumor removal only	4	5	
- Irradiation only	4	6	
- Tumor removal & iirradiation	1	21	

Prognostic factors affecting outcomes

In considering the factors affecting outcome (Table 4), the patients were divided into two groups according to the outcome, improved and dead. Prognostic factors were compared between the two groups. Gender, age (> 30 years), location of tumors, history of smoking and alcohol drinking did not have any effect on the outcome. Low grade astrocytoma had a significantly better outcome than high grade astrocytoma ($p < 0.05$). When comparing the treatment, tumor removal with irradiation had a significantly better outcome ($p < 0.05$).

DISCUSSION

Current management of patients with astrocytomas remains one of the most controversial issues, in part because a clear consensus concerning prognostic factors has not yet been established. The prognosis of patients with this tumor remains poor. Five year survival rate in low grade astrocytoma is 38 per cent[1]. Tumor recurrence appeared in 19 per cent[2] of patients with cerebellar pilocytic astrocytoma. The significant prognostic factors will be discussed according to this study and those of a larger series published in the recent literature[1-3] : tumor histological composition, surgical tumor removal, and adjuvant therapies.

Tumor Histological Grading

Although there are so many histological subtypes, astrocytomas are classified into astrocytoma, anaplastic astrocytoma, and glioblastoma multiforme according to its progressive malignant feature respectively. There are many variations of reports about the prognostic value of the histological finding[3-7]. Most publications[3,4] reported a better prognosis for low grade (astrocytoma) than high grade (gemitocytic astrocytoma, anaplastic astrocytoma and glioblastoma multiforme) astrocytoma as in this study. Even comparison within each group (between pilocytic astrocytoma and astrocytoma or anaplastic astrocytoma and glioblastoma multiforme) at any locations or age groups, the results were still the same, that there was a favorable outcome in lower grading[5-8].

Treatment of Astrocytoma

There is still controversy in the treatment of astrocytoma. Many types of treatment and outcome were reported in the literatures such as : total tumor resection, partial tumor resection with irradiation, biopsy with irradiation[9], irradiation alone, radio-isotope[10], chemotherapy[11], thermotherapy[12], photodynamic therapy[13]. Total tumor resection was the treatment with best outcome either in low grade astrocytoma[14] or high grade astrocytoma[15]. But, because of its ill-defined border or deep seated location, total tumor resection cannot be performed confidently. So, radiation therapy alone or as an adjuvant therapy is another treatment of choice, even in low grade astrocytoma[16]. As in this study, tumor removal with irradiation was the treatment with the best outcome[7,17].

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เนื้องอกของสมองชนิดไกลโอมา : ปัจจัยที่มีผลต่อการรักษา

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เนื้องอกในสมองชนิดไกลโอมาเป็นเนื้องอกที่พบบ่อย แต่ผลของการรักษาก็ยังไม่แน่นอน ผู้รายงานจึงได้ทำการศึกษาผู้ป่วยที่เป็นเนื้องอกในสมองชนิดไกลโอมาที่รับไว้ในสถาบันประสาทวิทยาตั้งแต่ เดือนมกราคม พ.ศ. 2541 ถึง ธันวาคม พ.ศ. 2542 จำนวน 41 ราย เป็นชาย 20 ราย หญิง 21 ราย มีอายุในช่วง 3–75 ปี อายุเฉลี่ย 39.78 ± 19.81 ปี อาการสำคัญสามอันดับแรกได้แก่ ปวดศีรษะ แขนขาอ่อนแรง และชัก ตำแหน่งของเนื้องอกส่วนใหญ่อยู่ที่ส่วนผิวของสมองใหญ่ ลักษณะที่พบในภาพถ่ายคอมพิวเตอร์สมองของเนื้องอกชนิดไม่ร้ายจะเห็นเป็นก้อนเนื้องอกที่มีความเข้มต่ำกว่าหรือเท่ากับเนื้อสมอง และเมื่อฉีดสารทึบแสงจะมีความเข้มมากขึ้นเล็กน้อย ผู้ป่วยถูกแบ่งออกเป็นสองกลุ่มตามผลของการรักษา คือ กลุ่มที่ผลการรักษาดีขึ้น และกลุ่มที่เสียชีวิต จากผลการศึกษาพบว่า เพศ อายุ ประวัติการสูบบุหรี่หรือดื่มสุรา และตำแหน่งของเนื้องอก ไม่มีผลต่อการรักษา แต่ชนิดของชิ้นเนื้อและวิธีการรักษามีผลต่อการรักษามาก เนื้องอกชนิดไม่ร้ายและการผ่าตัดเอาเนื้องอกออกตามด้วยรังสีรักษามักจะให้ผลการรักษาที่ดีกว่าอย่างมีนัยสำคัญทางสถิติ ผลของการรักษาทั้งหมดมีอัตราตายร้อยละ 21.95

คำสำคัญ : เนื้องอกสมอง, ไกลโอมา, แอสโตรไซโตมา, ปัจจัยที่มีผลต่อการรักษาของเนื้องอกสมอง

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