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Meningiomas (Grade II and III): Retrospective Study in Basrah

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Abstract

Background: Non benign meningiomas include atypical type (WHO grade II tumor) and anaplastic type (WHO grade III tumor). Usually, gross total resection (GTR) at the time of diagnosis is considered as the line of management, but subsequent prognosis and optimal management remain unclear. The study aimed to determine the characterized meningiomas features in Department of Neurosurgery, Al-Mauany Teaching Hospital, and Al-Basrah Teaching Hospital.

Methods: A retrospective study of patients with malignant meningioma in Neurosurgery Department from May 2019 to June 2024. This study included 51 newly diagnosed patients with malignant meningioma (30 females and 21 males, with the median age 49 years). We reviewed all histopathological reports of the patients. Data was collected from our patient's archiving system. We evaluate in this work the correlation between the above prognostic factors and recurrence rate. As regards the extent of tumor resection, we include in this study all patients with total tumor resection which are collected from operative data or postoperative Magnetic Resonance Imaging (MRI). Postoperative follow up patient's data was collected from computerized data system in outpatient clinics. The extent of surgical tumor resection was obtained by using the Simpson grading scale and depend on the operative note and post-operative radiology films.

Results: All patients data used in this study as age, gender, site of tumor, postoperative radiotherapy and extent of surgical tumor resection. This study included 51 newly diagnosed patients with meningioma (30 females and 21 males, the median age 49 years); 70% of them were in convexity, 100% of cases underwent total surgical resection and postoperative radiotherapy. Recurrence occurred in 22% of cases. Prognostic factors such as age, gender and tumor location and tumor types. As regard meningioma type, anaplastic type had significantly higher recurrence rate compared to patients with atypical meningioma. Yet, no other significant could be detected including demographic data such as age, gender, tumor location.

Conclusion: Patients with an anaplastic meningioma may develop a recurrent tumor than an atypical type. The anaplastic meningioma was a significant risk factor for shorter overall survival and for shorter disease-free survival. Radical surgical excision of the tumor or administration of adjuvant radiotherapy following initial incomplete surgical resection appears crucial for long-term treatment.

Keywords: Anaplastic, Atypical meningioma, Gross total resection, Neurosurgery operations, Adjuvant radiotherapy

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Introduction

In 1922, Harvey Cushing described the term meningioma first as meningeal arising tumors in the spinal cord and brain, and he found these tumors arise from the arachnoid cap cells [1, 2]. Meningiomas considered as the most existing primary intracranial extra axial tumors with an incidence of 2.3 - 8.3/100,000 [3, 4]. Usually, meningiomas are benign in nature and slowly growing tumor, but there are malignant types as atypical (15% - 20%) and anaplastic (1%-3%) varieties. The recurrence rate of meningiomas is low but it has bad clinical prognosis and higher mortality [4-6]. Sex, age, extent of tumor resection, location of tumor and prior radiation are risk factors for malignant meningioma. The incident happened around the 6th and 7th decades of life, but the malignant types exist in younger patients. Benign meningioma's are most common in women whereas the malignant meningioma occurs almost in men [7].

In relation to the site, non-benign meningioma's usually occurs in cerebral convexities more than at the skull base. On the other hand, when these meningioma's types exist at the skull base, they characterize with lower recurrence rates and good prognosis than similar tumors exist in cerebral convexities [5, 8].

Meningioma's have a WHO grading system based on many items such as histopathology, tendency for recurrence and aggressiveness of the tumor and according to the above items meningioma's classifies into grade I (benign), grade II (atypical) and grade III (anaplastic) [5]. Surgical tumor excision is the primary treatment for high grade meningioma. Small sized, asymptomatic meningioma's with benign features may be monitored or treated with stereotactic radiotherapy. Generally, GTR considered Simpson grades I-III, while subtotal tumor resection considered as Simpson grades IV-V [6, 9]. Recently, a sixth-grade category (Grade 0) was added when complete tumor resection with 2-3 cm more from the site of tumor insertion, with good outcome [10].

Radiotherapy is considered as an effective line of management for meningioma's. Literature based evidence concise that, adjuvant radiotherapy is usually an important and recommended line of management of incomplete resected grade II meningioma's and for grade

III meningioma's regardless of the extent of tumor resection [11-13].

The study aimed to determine the characterized meningiomas features in Department of Neurosurgery, Al-Mauany Teaching Hospital, and Al-Basrah Teaching Hospital.

Methods

A retrospective study of patients with malignant meningioma in Neurosurgery Department from May 2019 to June 2024. This study included 51 newly diagnosed patients with malignant meningioma (30 females and 21 males, with the median age 49 years). We reviewed all histopathological reports of the patients. Data was collected from our patient's archiving system. We evaluate in this work the correlation between the above prognostic factors and recurrence rate. As regards the extent of tumor resection, we include in this study all patients with total tumor resection which are collected from operative data or postoperative MRI. Postoperative follow up patient's data was collected from computerized data system in outpatient clinics. The extent of surgical tumor resection was obtained by using the Simpson grading scale and depend on the operative note and post-operative radiology films. We performed statistical analysis using SPSS software (Microsoft Windows, Chicago, IL, USA). Descriptive statistics (mean, SD, frequency, and percentage) were used to describe the characters. A statistical significance level of $p < 0.05$.

Results

All patient data used in this study as age, gender, site of tumor, postoperative radiotherapy and extent of surgical tumor resection listed in table 1. This study included 51 newly diagnosed patients with meningioma (30 females and 21 males, the median age 49 years); 70% of them were in convexity, 100% of cases underwent total surgical resection and postoperative radiotherapy. Recurrence occurred in 22% of cases.

Prognostic factors such as age, gender, and tumor location and tumor types included in table 2. As regard meningioma type, anaplastic type had significantly higher recurrence rate compared to patients with atypical meningioma. Yet, no other significant could be detected including demographic data such as age, gender, and tumor location.

Discussion

Malignant meningioma is a rare tumor and its optimal treatment is still debit in guideline. Benign grade I meningioma's are considered as 90% of all meningioma tumors. Atypical meningioma's represent 4.7% - 10% of all meningioma's, while the anaplastic type of account for only 1% - 2.8% of all meningioma's [1, 3]. In the diagnosis of malignant meningioma's we based on the WHO (2016) classification and its upgrading included brain invasion to the previous histological characteristic [14].

Many literature studies suggest that the extent of tumor resection, based on Simpson grade system, is considered the most important prognostic factor for good outcome in malignant meningioma patients [14, 15]. In our series, we select all cases with total tumor resection to know the effect of the different prognostic factors associated with outcome.

There was no statistical significance of age of the patients as prognostic factors. However, we find the age group 41 - 60 years old is the most age group for malignant meningioma in our study with high recurrence rate 56.25% which is different to results of Champeaux, et al. [16] reported that patients younger than 57 years had fewer operations than those above 57 years old since recurrence and OS were shown to be associated with age at tumor diagnosis [16]. In different study, Aghi et al. [9] report that age at diagnosis is closely associated with the overall survival of atypical meningioma [9].

As regard the sex, we do not find any statistically significant between the atypical and the anaplastic type and this different from some literature studies who find that female gender has been related to poor prognosis and characterized radiological features such as peri-tumoral edema, heterogeneous enhancement in post contrast studies and intra tumoral cyst formation have been implicated with lower median recurrence free survival [3, 4].

We found that the majority of malignant meningioma's occurs in convexity of cerebrum rather than skull base with the same results of Hug et al. [17]. On the other hand, the comparison between recurrence rate in convexity and skull base malignant meningioma, Hug et al. [17] found that the tumor recurrence rate was increased in skull base malignant meningioma, and this does not meet our results, and this may be due to the limited number of malignant skull base meningioma's included in our study (4 cases).

In our study, all patients sent to receive post-operative RT due to its significant as important treatment and this was compatible with literature studies which found that post-operative radiation is a very important line of the treatment of non-benign meningioma's. Five-year progression free survival increased from 15% - 80% when external beam radiotherapy was added to tumor resection for mom benign meningioma [8, 18]. Stereotactic radiosurgery is now used for malignant meningioma's due to the possibility of margin inclusion in the irradiation field with external beam radiotherapy. However, Lubgan et al. [19] found an excellent outcome with gamma knife radiotherapy when tailored as an adjuvant therapy after complete tumoral removal or as definitive treatment protocol [19, 20].

Conclusion

Atypical (grade II) and anaplastic (grade III) meningioma's remain challenging diseases, and optimal guidelines treatment is current

Table 1: Patients characters, tumors, and surgery.

Variables		No.	%
Median age (years)		49	-
Sex	Male	20	40
	Female	30	60
Meningioma	Atypical II	40	80
	Anaplastic III	10	20
Site of tumor	Convexity	35	70
	Parasagittal	8	16
	Sphenoid	2	4
	Falx cerebri	2	4
	Tentorial	2	4
	Olfactory	1	2
Surgical resection (GTR)		50	100
RT		50	100
Recurrence		11	22

Table 2: Cox regression analysis of univariate variables.

Variables	OR	P value	95% CI
Age	1.04	0.8	0.96 - 1.52
Sex	0.67	0.55	0.24 - 2.81
Meningioma (II vs III)	5.58	0.01	1.84 - 20.35
Site of tumor (Convexity vs other)	1.4	0.4	1.22 - 4.23

unavailable. Anaplastic type had significantly higher recurrence rate compared to patients with atypical meningioma. Otherwise, no other significant could be detected including demographic data such as age, gender, tumor location. The upcoming study must focus on the biological signature of these malignant tumor, as our reported prognostic factors are still statistically insignificant.

Acknowledgements

None.

Conflict of Interest

None.

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