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**TENTORIAL MENINGIOMAS**  
**APPROACHES, PIT FALLS AND COMPLICATIONS**  
**A REPORT OF 13 CASES**

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**ABSTRACT**

**Objective:** *Evaluation of the different surgical approaches applied in the management of tentorial meningiomas with special emphasis on pit falls, complications and final outcome with comparison to other series.*

**Method:** *This is a retrospective study of 13 patients with tentorial meningiomas operated upon by the authors in a period of 9 years with review of their perioperative planning .*

**Results :** *Thirteen cases of tentorial meningiomas included, 7 in posterior fossa, 4 tentorial leaflet ,one pineal region and one falcotentorial. Total excision was possible in 8 cases and almost total in 5 . There were 7 cases with good outcome (54%), 3 cases with fair outcome (23%), one case with poor outcome (7%) and 2 mortalities (15%).*

**Conclusion :** *Tentorial meningiomas being in an area closely related to eloquent neural and vascular structures, still represent a real challenge to neurosurgeons. In spite of the major advances in neurosurgical techniques all series of tentorial meningiomas still have a considerable incidence of morbidity and mortality. In this study it was found that the most important prognostic factor is the tumor size followed by the sidedness of the tumor .It was obvious that left sided tumors carry a higher incidence of morbidity and mortality.*

**Keywords:** *Tentorial –meningioma-complications- pitfalls- outcome*

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## INTRODUCTION

Tentorial meningiomas comprise approximately 9 % of all intracranial meningiomas, they can arise at any site along the unique anatomical structure of the upper and lower surfaces of the tentorium<sup>(1)</sup>. In spite of the tremendous improvement of the neurosurgical armamentarium, tentorial meningiomas still represent a formidable task due to the intimate relation of the tumor to the eloquent neural and vascular structures in the vicinity<sup>(2)</sup>.

## PATIENTS & METHODS

This is a retrospective study of 13 patients harboring tentorial meningioma who were operated upon starting from December 1995 till January 2005. Ten cases were females(77%) and 3 males(23%) the age of these patients ranged from 34 to 69 years with an average of 51.5 years. All patients were operated upon on elective basis leading the usual preoperative assessment. Brain CT with intravenous contrast was the first step in diagnosing all the 13 cases after which brain MRI was done to all patients. In 4 cases MRA and MRV

were done to check the possibility of straight or transverse sinus involvement and in one case only traditional angiography was done, in this particular case we wanted to perform preoperative embolisation<sup>(3)</sup> of the feeding branches of the mass however it was not possible in that case.

Ultrasonic aspirator facilitated the job in 7 cases but in the remaining 6 cases we felt that it will not add much specially that the smaller curved handle was not available. In this study the cases included were classified into 4 groups according to the site of the mass, group I included patients with tentorial leaflet masses (4 cases), group II included patients with falcotentorial region tumor (one case), group III included patients harboring tentorial meningiomas in the posterior fossa ( 7 cases) and group IV included one patient with a pineal region mass. Different surgical approaches were employed in this study depending on the sites of the mass.

In group I the subtemporal approach was used in one case of the 4 cases we opened the Sylvian fissure due to the anterior location of the mass but in the rest of the cases we did not use the transsylvian route. Zygomatic osteotomy was an important step in the

suptemporal approach which was done in 3 cases and this really reduces the temporal lobe retraction<sup>(4,5)</sup>.

In group II we approached this case via a suboccipital interhemispheric approach. In group III supra cerebellar approach was used. In group IV occipital transtentorial approach was the approach of choice<sup>(6)</sup>.

The tumor maximum diameter ranged from 3.2 cm to 6.5 cm. Post operative brain CT without and with contrast was the standard follow up method, it was done to all patients on the second post operative day and after 3 weeks, in some cases (4 cases) we needed to have serial brain CT done according to the patients clinical condition. Follow up MRI brain with contrast was done in addition to the usual CT in 7 cases. Only 4 cases were followed post operatively for a period of more than 5 years, the rest of patient were followed for a period ranging from 6 months to 2 years. In this study we applied the Simpson classification to assess the radicality of the tumor excision<sup>(7)</sup>, also we applied the terms good, fair and poor to describe the prognosis. The prognosis was good when the patient was able to return to the preoperative work and activities without or with minor

deficits, fair when the patient was unable to return to his or her usual preoperative activities due to a major deficit(s) but he or she was not dependant on others, poor when the deficits the patient had made him or her dependant on others for the daily activities, feeding and serving<sup>(8)</sup>.

## RESULTS

This study included 13 patients harboring tentorial meningiomas, 10 females and 3 males. Radical tumor removal (Simpson G I and II) was achieved in 8 cases (61.5%)

while in the remaining 5 cases (38.5 %) almost total excision was done (Simpson G III). Total excision was not achieved in those 5 cases due to straight sinus involvement in one case, involvement of the transverse sinus in one case, tight adhesion to the brain stem in one case and engulfment of posterior cerebral artery in 2 cases. The outcome was put in a scale of 4 grades; good, fair, poor and death.

In 7 cases (54%) the prognosis was good, those 7 cases were able to return to their preoperative activities, however some of them showed transient minor deficits postoperative (3 cases) as diplopia due to partial 3<sup>rd</sup> nerve palsy (one case) and mild bulbar

symptoms (2 cases) all these manifestations disappeared within 2 weeks or less.

In 3 cases the outcome was fair (23%) those patient were independent but with a residual deficit sever enough to prevent the patient to resume his or her normal preoperative activities .

In one case the patient complained of a left sided weakness postoperatively, the motor power was average G II and she had to use a wheel chair for 6 months, that's when she was able to walk with crutches and the motor power in the left upper and lower limbs improved to reach average G IV .

Another case of a fair prognosis, postoperatively the patient showed motor weakness with average motor power of G III in right upper and lower limbs and sensory dysphasia .The motor power in the right side improved and the patient was able to walk unsupported in several weeks however the dysphasia did not improve till the patient dropped follow up after one year.

The last case with a fair prognosis was a 54 years-old male who presented with left focal fits passing into secondary generalization, also on examination he showed ipsilateral homonymous hemianopia.

Preoperative MRI showed a huge left falcotentorial mass, he was operated upon through left interhemispheric suboccipital approach and the mass was removed totally, the patient suffered from visual agnosia plus Gertsman syndrome in addition to the preoperative deficits .Being an accountant he was unable to resume his work again. Following this patient up for about 2 years all the previous deficits improve except the hemianopia.

The only case with a poor prognosis was a 37 years old female who presented with only generalized fits, MRI showed a large left tentorial leaflet meningioma. Intraoperatively it went very smooth till an attempt was made to remove the most medial part of the tumor that is when a major arterial bleeding, most probably from the left posterior cerebral artery took place, and had to be clipped. Postoperatively the patient showed delayed recovery then she started improving till she reached the conscious level of localizing to pain with right sided weakness more in the right lower limb with no eye opening and she was still intubated .Postoperative brain CT done 24 hours later showed a large left temporal hemorrhagic contusion with starting

large left occipital hypodensity reaching up to the level of the basal ganglia .Few days later the patient showed progressive deterioration of the conscious level till she reached the conscious level of extension to pain and after a long struggle for several weeks the patient ended up in a vegetative state with tracheostomy and feeding gastrostomy.

This study included two cases of mortality , the 1<sup>st</sup> case occurred 5 days postoperative most probably due to massive brain stem manipulations .The other case of mortality occurred 20 days postoperatively , this patient showed manifestations of meningitis 5 days postoperative, and in spite of the fact that the patient was fully conscious with no deficits he died 2 weeks later due to meningitis .

**Table (1): Showing the patient's initials , age, sex, tumor site, actual tumor maximum dimensions, presenting symptoms and approach used.**

No of patients	initials	Age	Gender	Site of	Size	Presenting symptom	Approach
1	A.M	53	♀	Rt tentorial leaflet	5.5 X 5.8 X 4	seizures	Rt subtemporal
2	B.H.	54	♂	Lt falcotentorial	5 X4.5 X 6	Ipsilateral hemianopia	Left occipital interhemispheric
3	G.E.	49	♂	Post fossa	4 X 4.2 X 3.5	Headache	Suboccipital
4	KH.M	37	♀	Lt tentorial leaflet	4 X 3.5 X 3	seizures	Left subtemporal Zyg. osteotomy
5	K.A.	48	♀	Post fossa	5.5 X 4 X 4.5	Unsteadiness of gait	Supracerebellar
6	S.K.	46	♀	Pineal region	4.9 X 3.5 X4	Unsteadiness of gait	Occipital transtentorial
7	M.K.	50	♀	Lt tentorial leaflet	4.8 X 4 X 4.5	seizures	Left subtemporal
8	N.O	39	♀	Post fossa	4.5 X 4 X 3.9	Headache	Supracerebellar
9	N.K	69	♂	Post fossa	6 X 4.5 X 3.8	Unsteadiness of gait	Supracerebellar
10	Th.H	41	♀	Post fossa	3.5 X 3.5 X 4	Headache	Supracerebellar
11	S.A.	44	♀	Rt tentorial leaflet	3 X 4X 4	seizures	Right subtemporal Zyg. osteotomy
12	S.F	57	♀	Post fossa	5 X 5.2 X 4	Headache	Supracerebellar
13	Z.A	62	♀	Post fossa	4 X 4.5 X 3	Headache	Supracerebellar

*Table (2): Showing the tumor pathology, tumor maximum diameter, extent of tumor excision and outcome.*

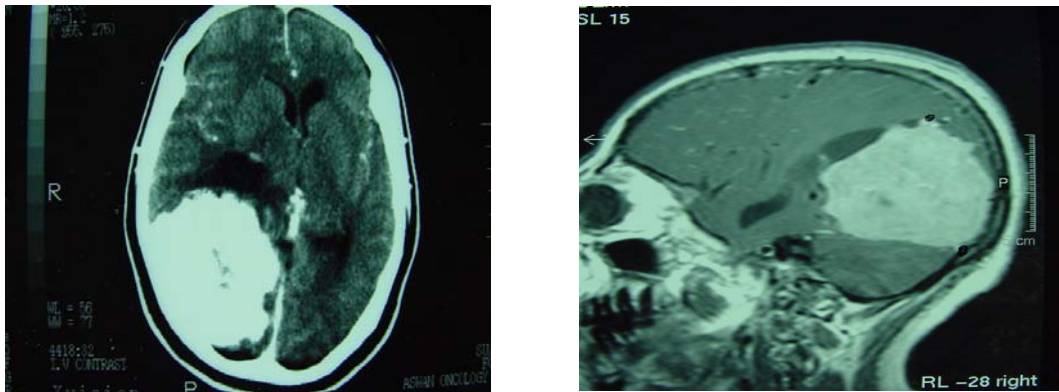
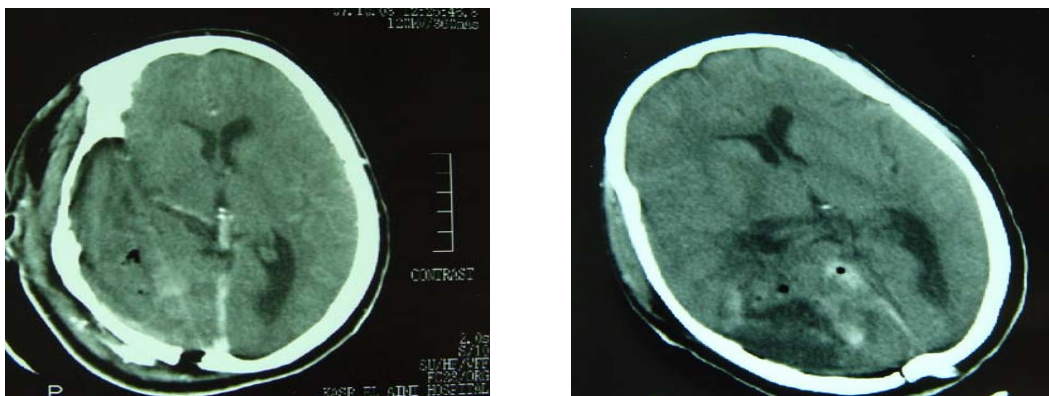
<b>Patient No.</b>	<b>Pathology</b>	<b>Tumor maximum diameter</b>	<b>Outcome</b>	<b>Extent of excision</b>
<b>1</b>	Psammomatous	5.8	Good	Total
<b>2</b>	Transitional	6	Fair	Total
<b>3</b>	Transitional	4.2	Good	Almost Total
<b>4</b>	Atypical	4	Poor	Total
<b>5</b>	Meningiothelial	5.5	Dead	Almost Total
<b>6</b>	Psammomatous	4.9	Good	Almost Total
<b>7</b>	Meningiothelial	4.8	Fair	Almost Total
<b>8</b>	Fibrous	4.5	Good	Total
<b>9</b>	Meningiothelial	6	Dead	Total
<b>10</b>	Atypical	4	Good	Almost Total
<b>11</b>	Fibrous	4	Fair	Total
<b>12</b>	Meningiothelial	5.2	Good	Total
<b>13</b>	Transitional	4.5	Good	Total

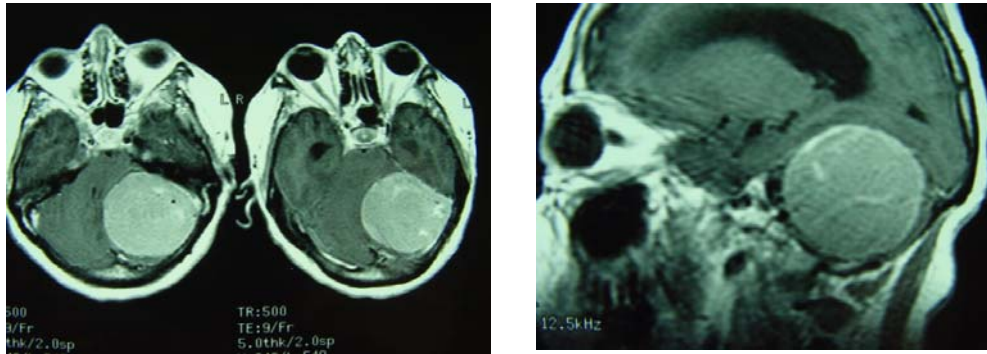
*Table (3) showing the relation between the extent of tumor excision and the outcome.*

	<b>Total no.</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>	<b>Dead</b>
<b>Total removal (Simpson GI, II)</b>	8	4	2	1	1
<b>Almost total removal (Simpson G III)</b>	5	3	1	0	1

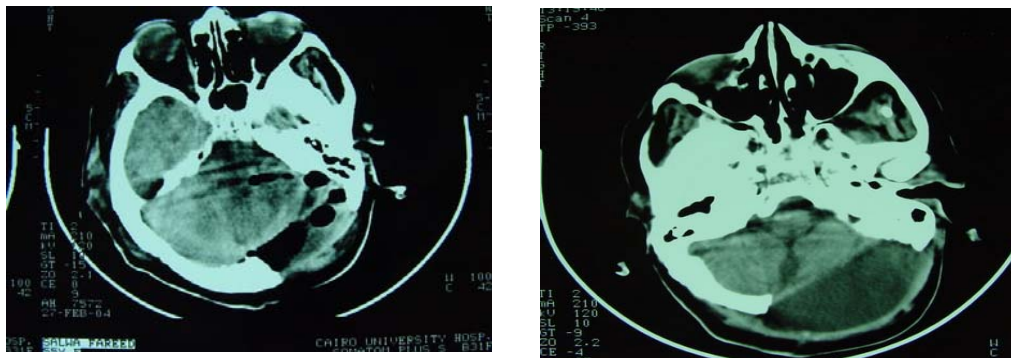
*Table (4): Showing a comparison between other series and this study.*

	Sugita & Suzuki(1)	Sekhar etal (2)	Guidetti etal (9)	This study
<b>Total no. Outcome</b>	49	27	61	13
<b>good</b>	88%	72%	62%	54%
<b>fair</b>	6%	17%	26%	23%
<b>poor</b>	2%	4%	12%	7%
<b>dead</b>	4%	7%	3%	15%

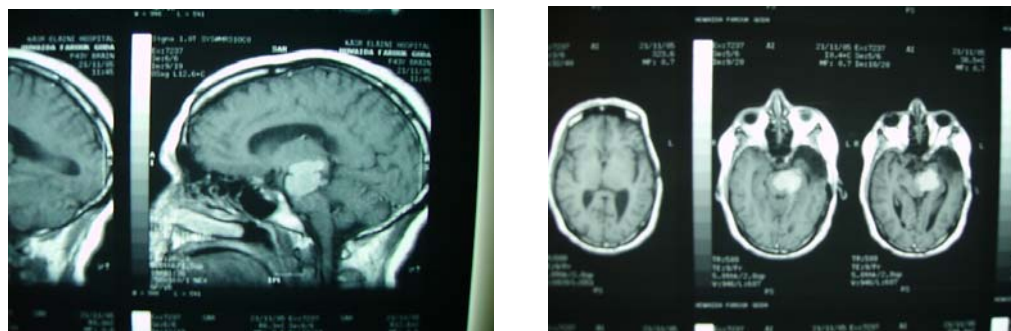
*Fig.(1): Showing axial CT with contrast, and sagittal MRI with contrast of a giant right tentorial meningioma (case no. 1).**Fig. (2): Showing postoperative CT of the above patient (case no.1). Total excision was achieved.*



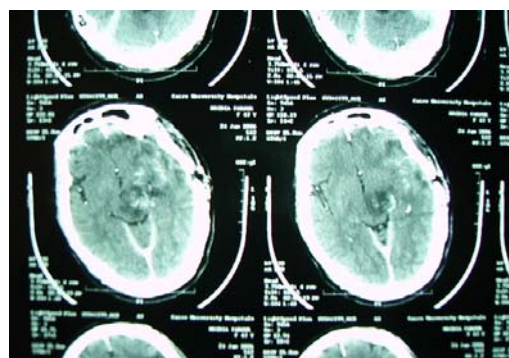
*Fig.(3): MRI axial and sagittal cuts, showing a left sided posterior fossa tentorial meningioma, (case no.12).*



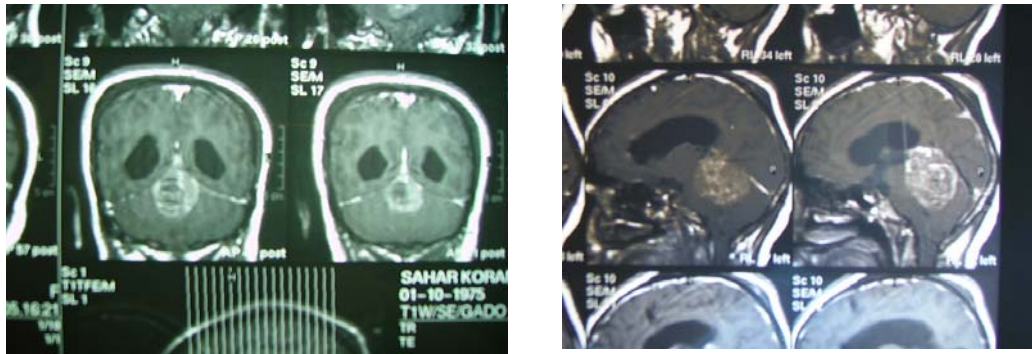
*Fig. (4): Showing postoperative CT of the same patient above (case no.12)*



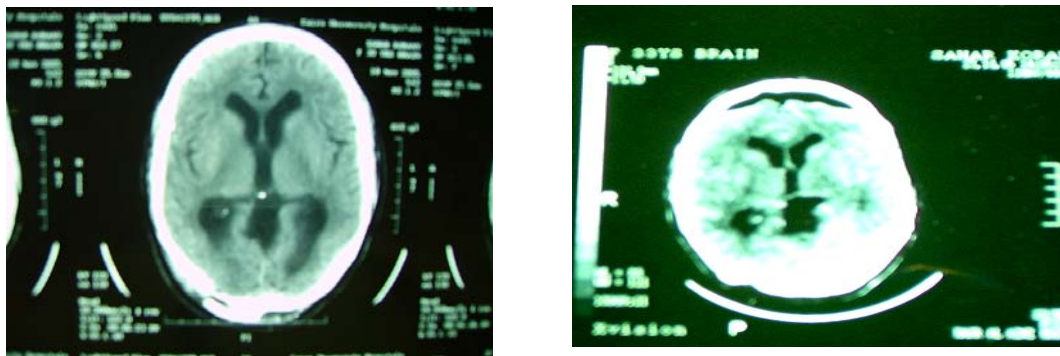
*Fig. (5): MRI sagittal and axial cuts showing left tentorial leaflet meningioma (case no. 7 ).*



*Fig. (6): showing postoperative CT of the previous case immediately postoperatively.*



*Fig.(7): MRI coronal and sagittal cut showing a pineal region tentorial meningioma (case no. 6)*



*Fig.(8): showing follow up CT brain of the previous case immediately postoperatively (to the right side) and 3 weeks later .*

## DISCUSSION

Meningiomas are usually benign tumors with good prognosis, they account for 13% - 17% of intracranial tumors, tentorial meningiomas account for about 9% of all intracranial meningiomas <sup>(1)</sup>.

Attempt of total removal of tentorial meningiomas should be the aim in every case, this should not be at the expense of having a viable individual postoperative because we are not treating the radiography of a mass but we are trying to treat a patient

with a mass. This fact was so clear and sometimes painful regarding some cases included in this study, specially case no. 4 in which we were faced with a major arterial bleeding on attempting removal of the most medial part of the tumor which was firmly adherent to the posterior cerebral artery and the patient ended in a vegetative state, also in case no 9 in which excessive manipulation on the brain stem on attempting total removal of the meningioma but this ended fatal.

In this study we categorized the patients into 4 groups based on the site

of the dural origin of the mass because each site had a completely different approach and operative planning.

**Observations regarding group I:** This group included 4 patients with tentorial leaflet masses ( cases no. 1, 4, 7 and 11) in all of these patients the approach selected was the subtemporal approach which was accompanied with zygomatic osteotomy in 3 cases of them. This step was of great value to minimize the urge for excessive temporal lobe retraction which was a genuine problem in the only case in which we did not do zygomatic osteotomy . In this case postoperative brain CT showed severe temporal contusion and edema leading to a poor prognosis .Splitting the Sylvian fissure was done in only one case when the mass was anteriorly placed , so in this case after controlling the blood supply of the tumor coming from the tentorium subtemporally we were able to complete the job transsylvian and to have a better visualization of the medial limit of the tumor and this allowed total removal .The trochlear nerve was injured in only one case but in the remaining cases there were a clear arachnoid plane between the tumor and the nerve. Total removal of the tumor was possible in 3 cases in

the last case we had to leave a small part of the tumor which was adherent to the posterior cerebral artery.

**Observations regarding group II:** This group included only one case of a left falcotentorial meningioma approached via a suboccipital interhemispheric approach ,this was the largest among our cases .This case was a candidate of MRV preoperatively to assess the patency of the straight a transverse sinuses ,but they proved to be patent and not involved .The real difficulty we faced regarding this case was related to the tumor size, however it went very smooth and was totally removed and the base coagulated, being in the left side we decided not to do occipital polectomy prehand and till this moment we did not reach an opinion whether or not it was appropriate not to do so ,because post operative the patient had a new deficit of visual agnosia and Gertsman syndrome added to the preoperative ipsilateral homonymous hemianopia .Fortunately all the new deficits improve in one year and he was left only with the hemianopia.

**Observations regarding group III:** This was the largest group of this study it included 7 patients with

tentorial meningiomas originating from the under surface of the tentorium. Five of these cases were laterally located and 2 were attached to the torcula, in those 2 cases only near total excision of the mass was possible due to involvement of the straight sinus in one case and the transverse sinus in the other case. The supracerebellar approach was selected to all cases during the craniotomy step the edge of the transverse sinus was an important land mark to allow maximum dural opening just at the edge of the sinus and this helped a lot in minimizing the cerebellar retraction. Two patients showed hydrocephalic changes preoperative, in both of them the mass was laterally located and did not require any CSF diversion after total excision of the mass. Insertion of a ventriculo- peritoneal shunt was needed in 2 cases who showed hydrocephalic changes 7 and 10 days postoperative. Two mortality cases were encountered (case no. 5&9) in the first case there were tight adhesions between the tumor and the pons and on trying to be as radical as possible excessive brain stem manipulation was done, this patient did not recover postoperatively and stayed ventilator dependant for 5 days before death. In the 2<sup>nd</sup> case total excision of the mass

was possible and the postoperative recovery was excellent, however manifestations of meningitis started few days postoperative and in spite of all the efforts done the patients died on the 2<sup>nd</sup> postoperative week.

#### ***Observations regarding group IV:***

This group included only one case of a pineal region meningioma. In this case the histopathological diagnosis was quite surprising because the tumor looked in the preoperative imaging as a pineal parenchymal tumor and even intraoperative the tumor was and partially succable and moderately vascular and there was a clear arachnoid plane between the tumor and the great vein of Galen and its tributaries

***Comparison with others:*** Multiple series of tentorial meningioma were found in literature and the following table shows a comparison between our series and others

This comparison revealed that the mortality rate in our study is higher and it is obvious that case no. 9 who died of meningitis had a significant influence on our results.

## **CONCLUSION**

Tentorial meningiomas being in

an area stuffed with important neural and vascular structures, still represent a real challenge to neurosurgeons, and in spite of the major advances in neurosurgical techniques all series of tentorial meningiomas still have a considerable incidence of morbidity and mortality<sup>(10)</sup>.

In this study it was found that the most important prognostic factor is the tumor size at the time of surgery, this was a clear fact taking into consideration that the three patients who showed poor prognosis or died were harboring the largest three tumors in size among all cases. The 2<sup>nd</sup> factor sharing in the development of morbidity was the side of the tumor and by far the left sided (dominant) tumors carried higher incidence of morbidity and mortality . Out of six cases showed fair or poor prognosis or died , four patients harbored a left sided tumor. The final and yet the most important conclusion is that , having a viable individual postoperatively must be the ultimate goal even if it was at the expense of radicality.

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