

Management of Intracranial Meningioma

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Abstract

Objective: The aim of this study is to evaluate different modalities of treatment of intracranial meningioma which admitted to neurosurgery department of Sohag University through two years.

Methods: we operated upon 30 patients with the oldest was 70 years old and the youngest was 16 years old, with mean age of 49.23 years 21 females and 9 males, according to the complaint the most common was headache in 20 cases, followed by fits in 12 cases, then weakness in 6 cases, and mental and behavioral changes in 5 cases, and vision changes in 4cases.

Results: The lesion was totally removed in 24 cases and subtotal in 6 cases. Among these 30 patients 22 patients improved, 7 patients remained the same, and one patient deteriorated. Among the 30 patients two patient complicated by CSF leak and 4 patients complicated by wound infection, and only two patients showed increased weakness, As for the pathology 7 cases with transitional meningiomas, 4 cases fibroblastic meningiomas, 2 cases with atypical meningiomas, 9 cases meningiothelial meningiomas, 5 cases psammomatus meningiomas, 3 cases mixed meningiomas.

Conclusion: The use of both computerized tomography and magnetic resonance imaging was found to be mandatory and none of them can replace the other for proper and accurate diagnosis and visualization of these meningiomas preoperatively. The choice of surgical approach remains that of surgeon guided by tumor nature and many other factors. Although these approaches were found to be extremely satisfactory when properly selected, every effort should be done for applying the minimally invasive approaches as well as key-hole surgery whenever appropriately indicated and with the availability of their modern technical instrumentations and adjunctive image guidance.

Keywords: intracranial meningiomas, surgical management, preoperative imaging.

Introduction

Meningiomas are relatively common extra-axial primary neoplasms that arise from arachnoid cap cells. ⁽¹⁰⁾

Meningiomas comprise approximately 33% of all primary brain tumors and the overall incidence in the general population is 2.3/100,000 people, the incidence of intracranial meningiomas increases with each decade of life and peaks in the 60-69 year age, there is a female predominance in patients over the age of 20 years. ⁽³⁾ Among

exogenous factors, cranial ionizing radiation is the only exposure that confers an increased risk of intracranial meningioma formation. ⁽³⁾The management of a patient with a meningioma begins with careful evaluation of the history and clinical findings. For many patients with a meningioma the only radiographic study needed is magnetic resonance imaging (MRI). If information is needed about bone detail, computed tomography (CT)

is done. Angiography is indicated in those patients in whom embolization may be a consideration or when more information about the arterial supply or venous drainage is needed to plan the operation than can be gained from MRI or MRA. ⁽⁴⁾The treatment options include surgery, radiation therapy, a combination of the two, or observation with periodic scans and examinations are then evaluated. In the future, chemotherapy may be added to the options. It is important to know what the patient's expectations are from the treatment program and to carefully weigh the short- and long-term benefits and risks. In many patients an operation is clearly indicated because of increasing disability, radiographic documentation of a surgically treatable tumor, and an assessment that this treatment can be done with an acceptable risk. ⁽⁴⁾ The objective of the operation is total removal of the meningioma including the dural attachment and bone that is involved with the tumor. The completeness of the surgical removal is the single most important prognostic factor. However, this goal must always be tempered by surgical judgment, recognizing that the first priority is to try to preserve or improve neurological function. For patients in whom total removal of the tumor carries significant risk of morbidity, it is better to leave some tumor and plan to observe the patient. In some patients the tumor may remain stable indefinitely. In others reoperation at a future date or radiation therapy is indicated. ⁽⁸⁾ The key considerations in tumor removal include: Careful positioning of the patient and a well-planned incision to give adequate exposure. Early interruption of the blood supply to the tumor. Internal

decompression of the tumor using the cavitron, cautery loops, and/or bipolar coagulation. Careful dissection of the tumor capsule, gradually displacing it into the area of decompression, dividing vascular and arachnoid attachments as they are encountered, and minimizing retraction on the surrounding brain tissue. Removal of involved dura and bone when possible. ⁽⁸⁾ Radiation therapy has been shown to arrest the growth of some meningiomas. The indications for its use have included residual tumor left at operation, recurrence, tumors that could not be treated surgically, and malignant histology. ⁽⁷⁾ Conservative treatment, not every patient with a meningioma needs an operation. In some patients, periodic clinical evaluation and MRI is an appropriate course to follow. The indications for observation include asymptomatic patients with little or no edema in the adjacent brain areas, patients with mild or minimal symptoms or those with a long history, older patients with a seizure or very slowly progressing symptoms, patients in whom treatment carries a significant risk, and patients who make the decision after being presented with the treatment options. ⁽⁹⁾

Patients and Methods:

Patient population:

This prospective and retrospective study conducted on 30 patients with different varieties of intracranial meningioma in Sohag university hospital in Egypt. All patients or their relatives (in case of comatose patients) will be consented and ask to volunteer for the study and the ethical committee of the hospital will be asked for the approval for this study.

Inclusion criteria: Patients with intracranial meningioma whatever its site.

Exclusion Criteria: Patient who are

deeply comatose, Patient associated with extra cranial meningioma and Medically unfit for surgery.

Clinical assessment:

- Thorough medical history.
- General examination.
- Neurological examination.

Investigations:

- Laboratory investigations.
- Computed tomography with and without contrast.
- Brain MRI, MRA AND MRV.

Management:

Patients are managed surgically under general anesthesia the patient position

and approaches to the meningioma will be selected according to the site of the mass. To avoid extensive brain surgery, a slack brain is needed and achieved by experienced neuroanesthesia and by surgical tricks for removal of CSF.

Follow up:

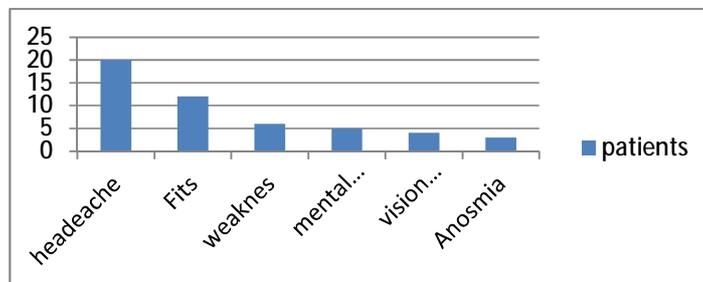
- All patients will be followed up postoperatively, during hospital stay and after management for 12months by assessing conscious level of patient and presence or absence of neurological deficit and radiographic investigations by: Computed tomography and MRI if indicated .

RESULTS

We operated upon 30 patients with the oldest was 70 years old and the youngest was 16 years old, with mean age of 49.23 years. We operated upon 30 patients 21 females and 9males.

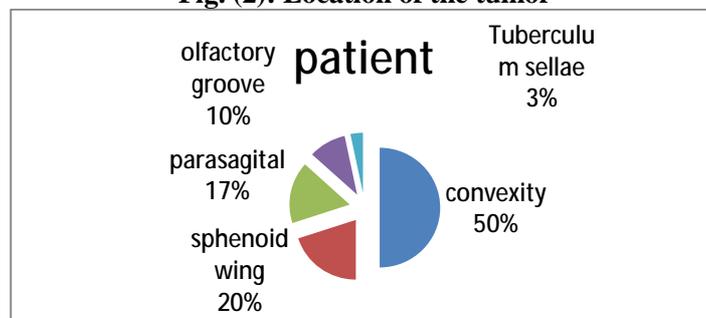
The 30 patients presented to us with several symptoms, the most common was headache in 20 cases, followed by fits in 12 cases, then weakness in 6 cases, and mental and personality changes in 5 cases, and vision changes in 4 cases.

Fig. (1):Complaints



The lesion was related to the convexity in 14 cases, and to the sphenoid wing in 6 cases, and to the superior sagittal sinus in 5cases.

Fig. (2): Location of the tumor



The lesion was totally removed in 24 cases and subtotal in 6cases.

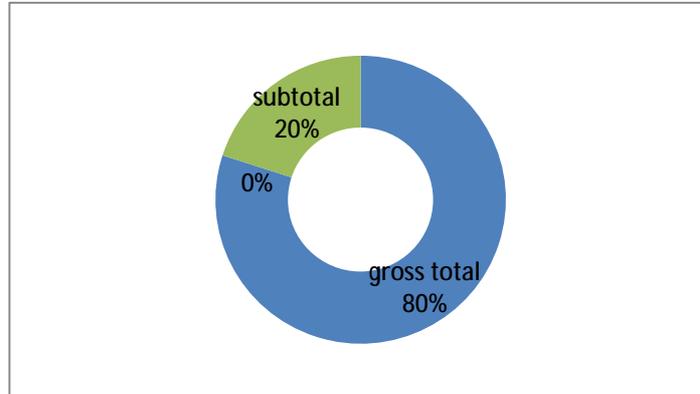


Fig. (3):Radicality

As for the pathology 7 cases with transitional meningiomas, 4 cases fibroblastic meningiomas, 2 cases with atypical meningiomas, 9 cases meningiothelial meningiomas, 5 cases psammomatus meningiomas, 3 cases mixed meningiomas

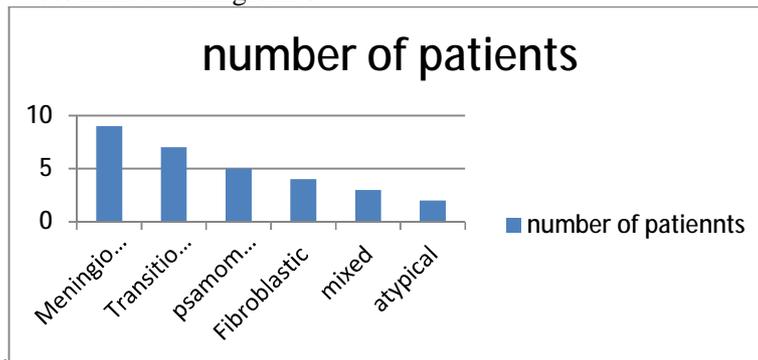


Fig. (4): Pathological types

Among the 30 patients 2 patient complicated by CSF leak and 4 patients complicated by wound infection, one patient developed hemorrhage and two patient show increased in weakness.

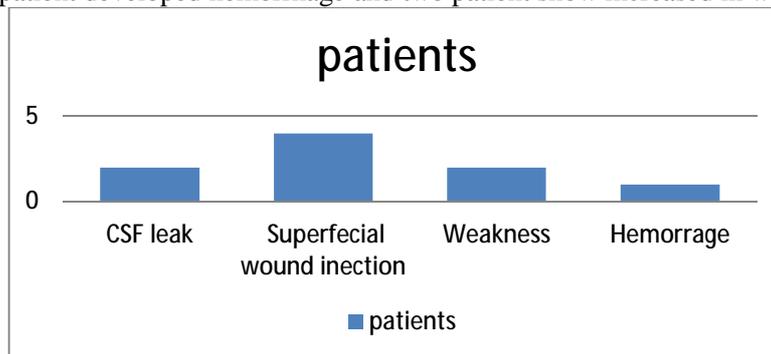


Fig (5):Complications

Among these 30 patients 22 patients improved, 7 patients remained the same and 1 patient deteriorated.

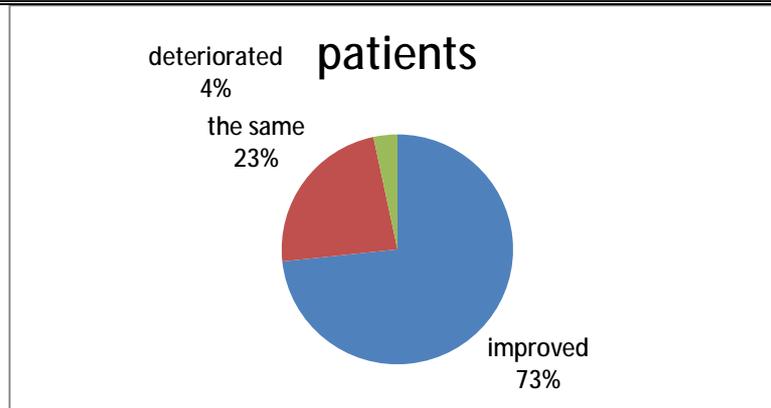


Fig. (6):Outcome

DISCUSSION

In our series we operated upon 30 patients, the oldest was 70 years and the youngest was 16 years with mean age of 49 years. While Robert, operated upon 43 patients the oldest was 81 and the youngest was 25 with mean age of 53 years. (Robert, 2008). Hirofumi Oyama et al. operated upon 16 patients the oldest was 83 years and the youngest was 51 years with mean age of 67 years (Hirofumi et al., 2010). Jose Charlos et al., operated upon 58 patients the oldest was 84 years and the youngest was 24 years with a mean age of 57 years. (Jose Charlos et al., 2013).

In our series we operated upon 30 patients 21 females (70%) and 9 males (30%). While Robert 43 patients, 32 females and 11 males (Robert, 2008). While Hirofumi et al. it included 16 patients, 13 females and 3 males (Hirofumi Oyama et al., 2010). Jose Charlos et al. 58 patients 35 females and 23 males. (Jose Charlos et al., 2013). In our study we operated upon 30 patients, headache was the chief complaint in 20 patients, fits were the main presentation in 12 patients, and weakness was the presenting symptom in 6 patients, while

mental and personality changes was the presentation in 5 patients, visual affection in the form of decreased acuity and field defects in 4 patients, and anosmia in 3 patients. While Jose Charlos et al, operated 58 patients, headache was the chief complaint in 39 patients, fits in 21 patients, motor deficits in 17 patients, visual affection in 12 patients (Jose Charlos et al., 2013). While Elena D'Avella et al, operated upon 15 patients 9 of them headache was the main complaint, fits was the presenting symptom in 7 patients, weakness was in 4 patients (Elena D'Avella et al., 2013). In NA BI et al, operated upon 26 patients all reported various degrees of dizziness and headache, 10 presented with epilepsy, 15 with lateral limb numbness, 16 with hemiparesis, 2 with coma (NABI et al., 2012)

In our study we operated upon 30 patients with total removal in 24 patients and subtotal resection in 6 patients. While HAN Wen-tao et al, operated upon 36 patients 29 of which were totally removed, and 7 cases were subtotally removed. (HAN Wen-tao et al., 2009). While Song Jun et al,

operated upon 35 patients with 28 cases totally removed and 7 cases were sub-totally removed. (Song Jun et al,1998). While ZhengWeiwu et al, operated upon 30 patients 23 of them undergone total resection and 7 cases were sub-totally removed. (ZhengWeiwu et al.,2010).MarcP. Sindou, M.D. et al, operated upon 92 patients with total removal in 85 patients, while subtotal removal in 7 cases. (Marc et al., 2006).In our series we operated upon 30 patients and their pathologies were 7 cases with transitional meningiomas, 4 cases fibroblastic meningiomas, 2 case with atypical meningiomas, 9 cases meningiothelial meningiomas, 5 cases psammomatus meningiomas, 3 cases mixed transitional and fibroblastic meningiomas. While Francisco Di Meco et al, operated upon 92 patients, were 13 cases with transitional meningiomas, 10 cases fibroblastic meningiomas, 3 cases with atypical meningiomas, 20 cases meningiothelial meningiomas, 24 cases psammomatus meningiomas, 22 cases mixed transitional and fibroblastic meningiomas. (Francisco Di Meco et al, 2004). On the other hand Girvigian et al ,operated upon 30 patients, were 5 cases with transitional meningiomas, 5 cases fibroblastic meningiomas, 4 cases with atypical meningiomas, 4 cases meningiothelial meningiomas, 5 cases psammomatus meningiomas, 6 cases mixed transitional and fibroblastic meningiomas(Girvigian et al., 2008). While Ni Ming-shan; Pan Xin; Zhu Yi-wen; et al, operated upon 35 patients, were 8 cases with transitional meningiomas, 7 cases fibroblastic meningiomas, 4 cases with atypical meningiomas, 4 cases meningiothelial meningiomas, 5 cases psammomatus meningiomas, 6 cases mixed transitional

and fibroblastic meningiomas(Ni Ming-shan; Pan Xin; Zhu Yi-wen et al., 1994). In our series we operated upon 30 patients 22 patients improved, 7 patients remained the same, and one patients deteriorated. While Francisco Di Meco et al. operated upon 92 patients, 70 patients improved, 6 patients remained the same, 16 patients deteriorated. (Francisco Di Meco et al., 2004). On the other hand Girvigian et al,operated upon 30 patients, 23 patients improved and 7 deteriorated (Girvigian et al., 2008). While Levoshko et al. operated upon 106 patients, 6 patients deteriorated, 5 patients remained the same, and 95 patients improved. (Levoshko,1999).

In our series we operated upon 30 patients from which two cases have CSF leak ,one case improved with conservative management and the other case complicated with meningitis which died, 4 case of wound infection that improved on antibiotics, two case of increased lower limb weakness that improved with physiotherapy and one case with intraventricular hemorrhage that improved with conservative treatment. While Francisco Di Meco et al, operated upon 92 patients air embolism occurred in a single patient, extradural and/or subdural hematoma in 3 patients, neurological deficit in 8 patients, venous infarction in 3 patients which died.(Francisco Di Meco et al,2004). On the other hand Girvigian et al, operated upon 30 patients 7 out of these patients developed posttreatmentsymptomatic peritumoral edema (SPTE). (Girvigian et al, 2008). While Seo BR et al,operated upon 39 cases, motor weakness in 11 patients, CSF leakage in 9 patients, single case of

seizure, a single case of post-operative hemorrhage. (Seo et al,2003).

References

1. Al-Mefty O, Topsakal C, Pravdenkova S, Sawyer JR, Harrison MJ. Radiation-induced meningiomas: clinical, pathological, cytogenetic, and cytogenetic characteristics. *Journal of neurosurgery*. 2004 Jun;100(6):1002-13.
2. Banerjee J, Pääkkö E, Harila M, Herva R, Tuominen J, Koivula A, Lanning M, Harila-Saari A. Radiation-induced meningiomas: a shadow in the success story of childhood leukemia. *Neuro-oncology*. 2009 Oct 1;11(5):543-9.
3. Black PM. Hormones, radiosurgery and virtual reality: new aspects of meningioma management. *Canadian journal of neurological sciences*. 1997 Nov;24(4):302-6.
4. Central Brain Tumor Registry of the United States. Hinsdale, IL: Central Brain Tumor Registry of the United States; 2009. Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in. 2004;2005.
5. Condra KS, Buatti JM, Mendenhall WM, Friedman WA, Marcus RB, Rhoton AL. Benign meningiomas: primary treatment selection affects survival. *International Journal of Radiation Oncology* Biology* Physics*. 1997 Sep 1;39(2):427-36.
6. Mirimanoff RO, Dosoretz DE, Linggood RM, Ojemann RG, Martuza RL. Meningioma: analysis of recurrence and progression following neurosurgical resection. *Journal of neurosurgery*. 1985 Jan;62(1):18-24.
7. Mason WP, Gentili F, Macdonald DR, Hariharan S, Cruz CR, Abrey LE. Stabilization of disease progression by hydroxyurea in patients with recurrent or unresectable meningiomas. *Journal of neurosurgery*. 2002 Aug;97(2):341-6.
8. Sughrue ME, Sanai N, Shangari G, Parsa AT, Berger MS, McDermott MW. Outcome and survival following primary and repeat surgery for World Health Organization Grade III meningiomas. *Journal of neurosurgery*. 2010 Aug;113(2):202-9.
9. Sughrue ME, Rutkowski MJ, Shangari G, Parsa AT, Berger MS, McDermott MW. Results with judicious modern neurosurgical management of parasagittal and falicine meningiomas. *Journal of neurosurgery*. 2011 Mar;114(3):731-7.
10. Wiemels J, Wrensch M, Claus EB. Epidemiology and etiology of meningioma. *Journal of neuro-oncology*. 2010 Sep 1;99(3):307-14.
11. Yasargil MG. *Microneurosurgery: Microsurgical anatomy of the basal cistern and vessels of the brain*.

