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Evaluation of Transcranial Approach for Management of Suprasellar Meningiomas

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ABSTRACT

Objective: *to evaluate the surgical outcome, the perioeperative complications and technical challenges of various transcranial approaches for excision of the suprasellar meningiomas.*

Methods: *A prospective randomized clinical study which is conducted on 20 patients with suprasellar meningiomas starting from June 2021till october 2023. All patients are evaluated clinically and radiographically preoperatively. Intraoperaive technical challenges are documented. Postoperaive evaluation included radiological assessment to evaluate the extend of resection, postoperative hospitalization, operation time, blood loss, and intraoperative complications.*

Results: *This study included 8 males and 12 females. The mean ago was 49.2 years old. Visual affection was the most common preoperative manifestation (100%% of patients for visual acuity and 80% for visual field). Maximal tumor diameter for was 5.2 cm. Gross total resection was achievable in 90% of cases. Post-operative assessment of the visual field and acuity revealed 70% with pre-operative visual affection showed post-operative improvement. Complications included, seizures, disturbed conscious level, hematoma, weakness, frontalis nerve palsy, subgaleal collection.*

Conclusion: *The transcranial route still reliable for management of suprasellar meningiomas providing a safe and efficient route to achieve gross total resection with minimal complications. Vascular encasement and large sized tumors always favor a transcranial route to seek a desirable outcome.*

Keywords: *Endoscopic endonasal, Transcranial, Minimal invasive surgery, Meningioma, Sellar region, skull base.*

INTRODUCTION

Suprasellar meningiomas are slow growing, benign tumors which account for 5–10% of intracranial meningiomas. They often present with visual impairment as a result of optic nerve and chiasm compression. The surgical management of these tumors can offer optic nerve decompression, preventing further visual impairment. [2]

Several surgical approaches have been utilized to excise suprasellar meningiomas, such as: the subfrontal approach (unilateral or bilateral) being used in the early years of macroscopic neurosurgery, the pterional,

frontolateral, or frontoorbital approaches with the development of microscopic techniques, and the supraorbital approach as an evolved minimally invasive subfrontal approach. [3]

The Transcranial route has been the gold standard in the surgical management of suprasellar meningiomas for >30 years. Surgical resection of these tumors can be challenging because of the adjacent and involved critical structures as the optic nerves, carotid and anterior cerebral arteries, the pituitary gland and stalk, and the hypothalamus. Through the past few decades, the surgical outcome has been dramatically improved as a result of the improvement of the microsurgical technique, high-resolution imaging, and intraoperative monitoring. [5]

AIM OF THE WORK

To analyse the surgical experience with suprasellar operated via the various transcranial approaches, with evaluation of the clinical outcome and discuss the advantages and disadvantages of each approach.

PATIENTS AND METHODS

This is a prospective randomized clinical trial study that will be conducted on 20 patients with suprasellar meningiomas who will be admitted to Cairo University Hospitals starting from June 2021to October 2023.

Inclusion criteria: Age: Older than 18 years, radiographic finding suggesting meningiomas involving the suprasellar area with no or with inferior or with medial invasion of the optic canal.

Exclusion criteria: Age: Younger than 18 years old, meningiomas with lateral extension to the optic nerve or the supraclinoid segment of the internal carotid artery, encasement of major arteries or severely narrowed intercarotid distance, meningiomas with inaccessible optic canal extension (superior or lateral extension), meningiomans with radiological anterior extension beyond the planum sphenoidale and recurrent cases.

Statistical analysis: data will be analyzed using the statistical program for social science (SPSS) version 24.0 using the appropriate statistical test. Categorical variables will be compared using two tailed Fisher's Exact test as appropriate. Normally distributed continuous variables will be compared using Student's t-test, while abnormally distributed variables will be compared using Mann Whitney u test. A p value < 0.05 will be statistically significant.

Preoperative Patient Evaluation: **History:** ***Personal history*** **included**: name, age, sex, occupation, residence, marital status, and special habits of medical importance. ***The presenting complaint:*** was the most single distressing complaint to the patient, other complaints were included in the patient's symptoms. ***The present history:*** evaluated the location, character, onset, course, duration, severity, frequency, diurnal/nocturnal variability, precipitating or relieving factors and associated symptoms of the condition. ***Neurological symptoms:*** included visual affection, as diminution of vision, blurring of vision, field defects, and diplopia; symptoms of increased intracranial tension as headache, vomiting and altered level of consciousness, cranial nerve affection, motor or sensory manifestations, fits and behavioral changes are also evaluated. Symptoms of hypothalamic and endocrinal affection, as growth retardation, anorexia, fatigue, diabetes insipidus, amenorrhea, galactorrhea and decreased libido were also noted. ***Past history:*** of surgery, medications, irradiation or other medical disorders were included.

Examination: ***General examination:*** patients' vital signs, height, weight, secondary sex characters, head, neck, chest and abdomen were examined. Signs and symptoms of endocrinal affection were also looked for as hirsutism, weight gain or loss, fatigability, increased sensitivity to cold or heat, frequent urination, irregular period, fat distribution, pigmentation, and facial features. ***Neurological examination:*** included examination of conscious level, cognitive function, speech, cranial nerves, motor power and sensory function. ***Visual examination:*** Visual

acuity is examined via Snellen chart. Visual field is examined by confrontation test or perimetry test.

Preoperative Planning: The preoperative planning is the cornerstone of achieving an uneventful successful surgery.

Investigations: ***Routine laboratory investigation:*** as CBC, liver and kidney function, PT, PTT, INR, blood sugar serum sodium and potassium were performed. ***Hormonal assays:*** were performed in lesions affecting the hypothalamus or the pituitary gland, or in cases with clinical endocrinal abnormalities. ***Radiological examinations:*** MRI with contrast is the gold standard radiological investigation for brain tumors. Pathologies were evaluated for site, size, shape, consistency, enhancement, calcification, and extension, the presence of associated edema, hemorrhage, hydrocephalus, and their relation to the adjacent vital structures. Multi axial, coronal, sagittal cuts were essential for planning, and inclusion.

Surgical Management: **Preoperative Preparation:** All patients were given pre- operative steroids; dexamethazone or hydrocortisone. 1 gram of a third generation cephalosporin was given intravenously after induction of anesthesia.

Operative Management: surgical findings included tumor composition, consistency, extension and attachment to the adjacent structures. Any complication or operative nuances that occurred during surgery was recorded and evaluated. Other surgical procedures as CSF diversion were also recorded. All specimens that were obtained were examined by a neuropathologist. The extent of resection was evaluated and subdivided into three groups; “Gross Total resection”: which is defined as 100% resection of the tumor. “Near Total resection”: which is defined as the resection is more than 90% resection of the tumor with residual less than $1cm^3$. “Sub-Total resection”: which is defined as the resection is less than 90% resection of the tumor. Recent studies questioned the eligibility of Simpson’s grading system to predict the recurrence rate based on the extent of resection as it was stablished fare prior to the worldwide usage of the MRI scans and microscopes. Also, the modern evolution of stereotactic radiosurgery affected the recurrence rate dramatically. Therefore, aggressive resections of the overlying bone and dura may not be needed to achieve similar recurrence rates as the original Simpson grades. But still a sub-total resection is associated with high recurrence rate specially with high grade meningiomas with boney infiltration. [6,7]

The Pterional approach: The patient is position in supine position with the head elevated and tilted to the opposite side 15-30° with neck extension to facilitate gravity retraction of the frontal lobe. The skin incision is planned just behind the hair line starting 1 cm above the zygomatic arch and within 1 cm in front of the tragus till the midline and even may cross it. A musculocutaneous flap is elevated for preservation of the frontal branch of the facial nerve. The temporalis fascia is detached from the superior temporal line and the muscle is bluntly dissected subperiosteally from inferior to superior with the same directions of the muscle fibers for preservation of the blood supply of the temporalis to avoid post-operative muscle atrophy. The craniotomy is planned and performed with either “Hudson drill and Gigle saw” or craniotome. The dura is peeled off the sphenoid ridge till the meningio-orbital ligament and then the sphenoid ridge is flattened using diamond drill or boney rongeur to provide an unobstructed line of sight to the skull base. The dura is opened in C-shaped fashion based on the skull base. Dissection starts with elevation of the frontal lobe, identification of the olfactory nerve and following it to the sphenoid ridge, it is where to find the optic never at its entry into the optic canal, lateral to it the carotid artery is identified. The carotid cistern is opened for CSF drainage and farther brain relaxation to avoid retraction as much as possible. The tumor is then identified in the suprasellar area.

The Supraorbital approach: Patients were placed in a supine position with the head tilted 0-15 degree to the contralateral side according to the site of the lesion. An eyebrow incision was used; the skin flaps were

temporarily retracted with four stitches, exposing the frontalis, the orbicularis oculi and temporalis. The frontalis was incised using a monopolar electrode knife just parallel to the glabella; the temporalis muscle was stripped from its bony insertion. Using strong stitches, the temporalis muscle was retracted laterally and the frontalis upwards. The subcutaneous tissue with the orbicular muscle is then gently pushed downwards to preserve this muscle. A craniotomy was performed using a high-speed drill, a single frontobasal lateral burr hole is placed posterior to the temporal line. Special attention must be given to the placement of this burr hole with regard to its relationship to the frontal skull base and to the orbit. After minimal enlargement of the hole with fine punches and mobilization of the dura, a high-speed craniotome was used to saw a straight line parallel to the glabella in a lateral-to-medial direction taking into account the lateral border of the frontal air sinus. Thereafter a Cshaped line is sawed from the burr hole to the medial border of the previous frontobasal line, thus creating a bone flap with a width of about 2.5 cm and a height of about 2 cm. After removal of the bone flap, drilling of the inner edge of the bone above the orbital rim under protection of the dura using the high-speed drill and removing the small osseous extensions of the orbital roof allow perfect exposure and easy introduction of micro-instruments into the field. In cases where high-speed drill was not available, Hudson brace was used and three burr holes were drilled, one above the supraorbital notch lateral to the frontal sinus, one frontobasal laterally at behind frontozygomatic suture, and a third one centered high above the other two. The holes were then connected by a Gigli saw. The dura was then opened in a curvilinear fashion close to the base and retracted downwards using 2 sutures.

General microsurgical techniques were used to handle the lesion. At closure the dura was closed water tight, the bone flap was placed back, the pericranium was re- approximated if not used for duroplasty and it helps to hold the bone flap in position. The galea was closed by interrupted absorbable sutures and the skin closed in subcuticular cosmetic fashion.

Postoperative care: postoperative, all patients spent the first 24 hours in intensive care unit. Patients continued receiving the same third generation cephalosporin intravenously for three days and then shifted to oral amoxicillin clavulanate for 1 week. Patients receiving preoperative hormonal supplementation were kept on them postoperatively. Serum electrolytes, hemoglobin, and renal functions were obtained in the early postoperative period. Urine output was also recorded.

A complete neurological evaluation was performed for evaluation of consciousness, visual functions, cranial nerve affection, hypothalamic manifestations, frontal manifestations or other neurological deficits. Variable forms of morbidity such wound infection, neurological deficits, and endocrine dysfunction were documented. Mortality causes and timing were also documented.

Patients continued hospitalization till they were found stable enough for discharge. A postoperative CT scan or MRI was performed before discharge.

Patients with endocrine dysfunction were referred to an endocrinologist.

Follow up and outcome: All patients had a variable period of follow up on an outpatient basis. Follow up included newly developed neurological manifestations or delayed postoperative complications. Also, the progression or regression of any immediate postoperative morbidities is evaluated. Follow up radiological evaluation was performed when necessary.

RESULTS

Demographics: 20 patients with suprasellar meningiomas fulfilled the inclusion and exclusion criteria of this study from June 2021to october 2023. 12 patients were operated via the pterional approach and 8 patients via the

supraorbital approach. This study included more females (n = 12) than males (n = 8). The mean age was 49.2 for all patients. The operative time was recorded starting from induction of anesthesia until the patient is out of the operating room, mean = 4 hours and 53 minutes. The availability of ultrasonic aspirator has much influence on the operative time especially in large size tumors. The mean blood loss was calculated which mean was = 233.4 ml. The hospital stay mean was mean = 3.4. *(Table: 1)*

Table 1: Demographic distribution

Variable	
Sex	
Male	8
Female	12
Age	
Mean	49..3
Max	58
Min	27
Mean Operative Time	4:53
Mean Blood Loss	233.4 ml
Mean Hospital Stay	3.4days
Recurrence	1

All patients were followed up for 3-6 months post-operatively. 1 patient showed recurrence in radiological follow up 6 months post-operatively with no development of new symptoms. And he was referred for radiotherapy.

Preoperative Symptoms and Signs: The most common presentation was diminution of visual affection, 100% for the acuity and 80% for the field. Followed by headache in 35% of cases. *(Table 2)*

Table 2: Distribution of Symptoms

Symptoms & Signs	
Visual Acuity	20
Monocular	15
Binocular	5
Visual Field Defect	16
Monocular	12
Binocular	4
Headache	8
Seizures	2
Behavioral Changes	-
Hormonal Disturbance	-
Memory Deficit	1

Radiological analysis: All tumors appeared as extra-axial, well circumscribed, isointense relative to gray matter with homogeneous post contrast enhancement with dural tail in MRI. 5 (25%) showed skull base hyperostosis. 6 (30%) showed peritumoral edema. The mean tumor volume was 6.92 cm^3 and the largest tumor was 24.2 cm^3. Most of the tumors were limited to the tuberculum sellae, 11(55%) cases. 6 (30%) cases had optic canal invasion. *(Table 3.)*

Table 3: Radiological Extension

Radiological Analysis	
Extension	
Tuberculum	12
Planum	4
Planum / tuberculum	4
Tumor Volume	
Mean	7.51 cm^3
Max Diameter	5.2 cm
Optic Canal Invasion	
Unilateral	3
Bilateral	1

Pathology: Meningothelial (WHO Grade I) was the most common pathological subtype with (13) 65% cases, follow by transitional 20% and transitional 10%, 1 case was atypical meningioma (WHO Grade II). *(Table 4)*

Table 4: Pathologies of the lesions

Pathology	Patients	Percentage
Meningothelial (Grade I)	13	65%
Fibroblastic (Grade I)	4	20%
Transitional (Grade I)	2	10%
Atypical (Grade II)	1	5%

Extent of resection: Gross total resection was achievable in 90% of case. Near total resection was achived in 1 case with residual attached to the right carotid and the cases with subtotal resection was one of the earlies cases in our study, only central debulking was achieved *(Table 5)*

Table 5: Extent of resection

Extent of Resection	
Gross Total Resection	18
Near Total Resection	1
Sub-total Resection	1

Visual & Clinical Outcome: All patients were followed up in the outpatient clinic postoperatively. The shortest period of follow up was 3 months, the longest was 6 months.

As visual affection was the most common preoperative manifestation. Post-operative assessment of the visual field and acuity revealed 50% with pre-operative visual affection showed post-operative improvement. *(Table 6, Chart:1)*

Table 6: Visual affection postoperatively

Visual Assessment	
Pre-operative affection	20
Improved	10
Stable	8
Deteriorated	2

Post-operative complications:

2 patients developed new onset of seizure, which was controlled medically. three patients had subgaleal collection which resolved on 6 weeks follow up. Two patients developed frontalis nerve palsy. 1 superficial wound infection, the patient was diabetic, which is cured. 1 patient developed frontal lobe hematoma which led to slight deterioration of consciousness. She had a prolonged hospital stay, but she regained her consciousness and was discharged in a perfect condition. 2 patients developed hydrocephalus, 1 of them presented with sudden deterioration of consciousness 10 days postoperatively and the other one presented with severe headache and ventriculomegaly on routine radiological follow up 2 weeks postoperatively. They were operated upon V-P shunt. One of them developed meningitis and the shunt was replaced with EVD, 10 days later the patient died. 1 case had recurrence on 6 months follow up and was refereed for radiotherapy.

(Table 7)

Table 7: Postoperative Complications

Complications	
Seizure	2
CSF leakage	-
Permanent Diabetes Insipidus	-
Weakness	1
Hydrocephalus	2
Deterioration of Consciousness	1
Hemorrhage	1
Radiological Brain edema	4
Cranial Nerves Affection	-
Frontalis Nerve Palsy	2
Superficial Wound Infection	1
Subgaleal Collection	3
Meningitis	1
Recurrence	1
Mortality	1
Total Number of Events	22

DISCUSSION

Through the past three decades, suprasellaer meningiomas have been an interesting challenge for many surgeons worldwide. Several approaches have been described to deal with these lesions. Starting by the pterional and the subfrontal approach evolving to the supraorbital approach with its variations. Fashioning the skin incision and the craniotomy aims to adjust achieving the surgical goals with minimal disruption of tissues.

Evaluating the extent of resection in this study:

The gross total resection has been always the goal of meningioma surgery, but avoiding morbidities always comes prior to gross total resection. The Simpson's grading system was initially described to establish the relationship between the extend of resection and the liability of recurrence. However, in cases of suprasellar meningiomas the attached dura could be adequately resected via the endonasl approach except for the lateral dura in relation to the carotid artery or the optic nerve. We tried to avoid over- or under-grading of the Simpson's grade by categorizing the extend of resection into three categories; gross total resection, near total resection, and subtotal resection which seemed more accurate to compare between the two approach at this point.

90% of cases achieved gross total resection. Two cases have near total resection. The 1 st case was operated via the supraorbital approach in which the residual was just below the ipsilateral optic nerve. It is one of several blind spots of the supraorbital approach such as the intrasellar space, below the sphenoid ridge, and the cribriform plate. An extensive optic nerve manipulation was needed to get to that residual. The second case operated via the pterional approach, the tumor was extensively adherent the carotid artery and so it was left behind to avoid the risk of carotid injury.

Visual outcome: Our study showed 50% improvement of vision and 40% of stable vision with 10% postoperative deterioration. The transcranial approaches do not always offer the best exposure to tumor as the optic nerve always stays between the surgeon and tumor, variable amount of optic nerve manipulation is required to achieve gross total resection. Also, postoperative visual outcome is markedly related to the tumor size, the duration of the preoperative visual affection and the intensity of affection.

Post-operative complications:

several approach related complications were recorded. Such as subgaleal collection and frontalis nerve palsy. The subgaleal collection totally resolved on 6 weeks follow up. The frontalis nerve palsy could be avoided if the craniotomy is performed with a quite experienced neurosurgeon. The only statistically significant complication was the radiological post-operative brain edema which is due to the extensive brain retraction specially with using a fixed brain retractor. Also, 1 patient had frontal hematoma and alternation of consciousness which managed conservatively and the patient regained her consciousness on the 7 th post-operative day. Two patients had post-operative hydrocephalus. The 1 st one presented to the outpatient clinic on the 10 th day with severe headache and blurring of vision for 3 days and on examination the patient had bilateral grade 3 papilledema. The CT scan showed significant ventriculomegaly. The patient was operated upon V-P shunt placement and all the previous symptoms was resolved. The 2 nd patient presented to the emergency department on the 12 post-operative day with sever deterioration of the consciousness, GCS 6/15. CT scan showed sever ventriculomegaly. The patient was operated upon VP-shunt. Post-operatively, the patient started to regain consciousness, GCS 9/15 on the 2 nd postoperative day. Couple of days later, the patient developed high grade fever with deterioration of consciousness. CSF sampling revealed elevated TLC. The shunt was replaced with external ventricular drain and the patient started

intravenous and intra-ventricular antibiotics according to the CSF culture and sensitivity test. Five days later the patient had sudden cardiac arrest and died.

Results other series: ***Evan D. Bander et al.*** compared the transcranial approach versus the endoscopic endonasal approach in as similar cohort. His study included 32 patients. They were divided into 2 groups, endonasal group included 17 patients and the transcranial group included 15 patients. All patients had a comparable tumor size. The extent of resection was not significantly different between the 2 groups (98.80% ± 3.32% vs 95.13% ± 11.69%, p = 0.206). Postoperatively, the transcranial group demonstrated a significant increase in the brain edema signal compared with endonasal patients (4.15 ± 7.10 vs -0.69 ± 2.73 cm 3, p = 0.014). Also, the postoperative diffusion-weighted imaging signal of cytotoxic ischemic damage was significantly higher in the transcranial group (1.88 ± 1.96 vs 0.40 ± 0.55 cm 3, p = 0.008). Overall, significantly more endoscopic endonasal patients experienced improved or stable visual outcomes compared with TCA patients (93% vs 56%, p = 0.049). Visual deterioration was greater after TCA than EEA (44% vs 0%, p = 0.012). While more patients experienced postoperative seizures after the transcranial approach (27% vs 0%, p = 0.038). The CSF leakage and anosmia after the endonasal approach were higher (11.8% vs 0%, p = 0.486 and 11.8% vs 0%, p = 0.118, respectively). [2]

Yeong Jin Kim et al. analyzed and compared the surgical outcomes of contralateral subfrontal approach to Preoperatively, 61 patients (82%) had vision symptoms and 73 (99%) had optic canal invasion by tumor. Gross-total resection was achieved in almost all patients (n = 70, 95%). The visual function improvement and stabilization rate was 91% (67/74). Eight patients (11%) showed a worsening of visual function on the less-compromised (approach-side) optic nerve. There was no occurrence of cerebrospinal fluid leakage. Four patients (5%) experienced recurrences after the initial operation (mean follow-up duration 63 months). There were no deaths in this study. [8]

Karam Kenawy et al. operated 17 patients with tuberculem sellae meningiomas with a mean age of 46.3 years. Female patients constituted 70% of cases. Pterional approach was used in 59% of cases and unilateral subfrontal approach was used in 41% of cases. Gross total tumor removal was achieved in 82% of cases. Visual acuity improved in 47%, remained unchanged in 41%, and worsened in 5.9% of patients. Transient post-operative diabetes inspidus and post-operative haematoma in tumor bed each occurred in 5.9% of patients. [4]

Romani, Rossana *et al.* achieved complete tumor removal in 45 patients (87%). Of 42 patients, preexisting visual deficit improved in 22, remained the same in 13, and worsened in 7, and de novo visual deficit occurred in 1 patient. At 3 months post-discharge, 47 patients (90%) had a good recovery, 4 (8%) were moderately disabled, and 1 (2%) died 40 days after surgery of unexplained cardiac arrest. Seven patients (13%) had minimal residual tumors, 2 of which required reoperation. During the median follow-up of 59 months (range, 1-133 months), tumor recurred in 1 of the patients who had undergone a second operation. [9]

In Rudolf Magnus brain center, Utrecht University, **Ivo S. Muskens et al.** underwent a systematic review of the literature from 2004 till 2017. Sixty-four case series were included in this meta-analysis. The gross total resection not significantly higher at the transcranial group (83.0% vs 85.8%, p-value = 0.34). Visual improvement was higher for the endoscopic endonasal approach than the transcranial approach (p-value < 0.01. CSF leak was significantly higher among the endonasal approach cases (19.3%, vs. 5.81%, p-value < 0.01). Intraoperative arterial injury was higher among the endoscopic endonasal group (4.89 vs.1.86, p-value = 0.03). Mortality was not significantly different (p-value = 0.88). [1]

In Johns Hopkins University, **Adrian E. Jimenez et al.** conducted a PRISMA-compliant systematic review of literature detailing the outcomes of both approaches. Forty-four retrospective studies were included in this meta-analysis most of them from single centers, from 2004 till 2020. The endonasal approach showed significantly

higher rates of visual improvement (p-value = 0.0053) and significantly higher rates of CSF leakage (p-value = 0.0098) in comparison with the transcranial approach. However, there were no significant differences between the post-operative visual deterioration (p-value = 0.17), complications (p-value = 0.51), and gross total resection rates (p = 0.30) for the two approaches. In the early studies, the endoscopic approach showed high rates of CSF leaks which ranged from 25 to 40%. Recently, the evolution of skull base repair techniques and the frequent application of the vascularized naso-septal flap have lowered the rates reaching 5%. [10]

Our experience with the transcranial route:

About the supraorbital keyhole approach, the preoperative planning is very important as the approach is small and very limited, an intraoperative correction is only possible by performing an additional craniotomy. Therefore, the preoperative diagnostic imaging is of paramount importance to develop a surgical strategy. In our study we found that preoperative evaluation to locate the level of the lesion in relation to that of the middle cranial fossa and sphenoid ridge is important.

We have also found several points that are helpful to allow a swift surgery. First adequate head positioning is important as the degree of head rotation and inclination is important. Excessive rotation allows view of the anterior cranial fossa, while reducing rotation allows a more direct view into the sellar region. In cases with anterior cranial fossa lesion rotation of 40-60 degrees is satisfactory, while approaching the tempromesial area and carotid bifurcation a rotation of 10-20 degrees is needed, in cases with sellar and suprasellar extension rotation of 30-40 degrees with put the sellar region in the center of the operative field. Also adequate head extension is needed to allow the frontal lobe to fall backwards.

We noticed that placing the skin incision in the eyebrow was more cosmetic than placing it above the eyebrow. Also at times the skin itself was an occasional obstacle to the view of the surgeon, this was overcome by taking two or three sutures in the subcutaneous tissue and retracting the skin backwards and suturing it to the drapes. Again adequate subcutaneous dissection is needed in case a more lateral craniotomy is to be placed. The skin over the frontal area can be easilyretracted and mobilized with sufficient subcutaneous dissection. In this way the frontozygomatic suture can be reached without the need to extend the incision. If the skin incision must be extended, placing it in a skin crease offers a good cosmetic outcome. During dissection, exposure of the frontal and orbital muscle and its retraction downward towards the globe should be restricted to a necessary minimum to avoid postoperative peri-orbital edema.

Once the dura is opened it is necessary to allow sufficient CSF to be aspirated to allow the frontal lobe to become lax and fall backward. One should not be hasty and in a rush while performing this step which is of great importance in providing enough space for completion of the procedure without brain retraction. Also one should take his time in performing internal debulking of the lesion, by time the lesion becomes small and all its edges come into view. In some instances the medial part of the sylvian fissure can be opened allowing separation of the frontal lobe from the temporal lobe.

The pterional approach provides wider surgical field allowing an easier slyvian fissure slip in the early stage of the surgery which may allow dynamic retraction of the frontal lobe. It also provides approaching the inferior aspect of the ipsilateral optic nerve via the optico-carotid triangle. For lesions with more superior extension, more frontal lobe retraction is required for handling the superior portion of the tumor.

CONCLUSION

The transcranial route still reliable for management of suprasellar meningiomas providing a safe and

efficient route to achieve gross total resection with minimal complications. Vascular encasement and large sized tumors always favor a transcranial route to seek a desirable outcome.

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