Visual Outcome after Microsurgical removal of Craniopharyngioma via Pterional Craniotomy

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ABSTRACT

Background: Craniopharyngioma is a benign tumor of sellar & Suprasellar area with bimodal distribution. Visual disturbance is one of the common clinical presentation. Early surgical intervention results in favourable results.

Objective: To analyze visual outcome after surgical removal of craniopharyngioma via pterional craniotomy.

Material and Methods: This observational descriptive case series was conducted at department of neurosurgery, LRH/Peshawar. Duration of study was 18 months from Jan 2017 to June 2018. The study included patients with craniopharyngioma, who underwent surgery in elective setup, newly diagnosed cases and patients operated via pterional approach. All those patients who presented in crisis like acute hydrocephalus, operated via other approaches and recurrent cases were excluded from this study. The changes of visual function (visual acuity and field) of the patients were assessed preoperatively and postoperatively, documented by a predesigned proforma and paired data of this change were compared. Visual assessment was done on follow up visits on 2 weeks,1 month,3 months and 6 months. Chi square test was applied as statistical test. Data was analysed through SPSS version 17.

Results: Total number of patients were (30) with Male to female ratio was 1.5:1.Age of patients were Ranging from 4 year to 62 years (mean 35 years).There were 23 Children (76.6%) and 7 Adults (23.3%).Out of 30 patients, 21 patients(70%) presented with visual disturbance and 9 patients (30%) had non opthalmogical symptoms. Optic atrophy was seen in 6 patients (20%) pre-operatively. Per operatively tumor was found in suprasellar area in 24 patients(80%) and in both supra+infrasellar area in 6 patients(20%). Tumor size was less than 3cm in 19 patients(63.3%) and more than 3cm in 11 patients(36.6%). Morphology per operatively was cystic in 19 patients(63.3%), solid in 5 patients(16.6%) and both solid and cystic in 6 patients(20%). Calcification in tumor was seen in 16 patients(53.3%). Gross total resection(GTR) of tumor was done in only 21 patients(70%). Post-operative follow up assessment of visual status showed that (50%) of patients improved.

Conclusion: Craniopharyngioma is a benign tumor with malignant behaviour so timely intervention give favourable results.

Key words: *Visual outcome, Craniopharyngioma, pterional craniotomy.*

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INTRODUCTION

Craniopharyngioma is a unique benign tumor seen at sellar/Suprasllar region of the brain. Craniopharyngioma can build to enormous sizes just like a huge golf ball compressing the visual appratus(Optic nerves, chiasma and tracts) and causing visual impairment. It may remain silent at early stages of disease. Craniopharyngioma has two histopathological types i.e Adamintonomatous type and Papillary type. Adamantinomatous craniopharyngioma is seen predominantly in children, this type calcify mostly and diagnose easily by CT scan and on the other side adult Craniopharyngioma, called Papillary Craniopharyngioma don not calcify.[1,2,3]

Craniopharyngioma precisely compresses anterior visual apparatus causing primary optic atrophy, but may also cause hydrocephalus and dangerous factor in children evaluation is more papilledema in rare conditions. The most severe and permanent visual loss in children due to delay in diagnosis [8,15].

WHO (World Health Organization) classify Craniopharyngioma as grade-I tumour due to absence of malignant features. Incidence rate is equal in males and females. It is more common in children (aged 5 to 14 years) & in elderly adults (65 to 74 years) according to Central Brain Tumor Registry of the United States (CBTRUS).[2,4]

Craniopharyngioma is a slow growing tumor and visual deterioration is delayed until it causes compression of visual structures(Optic nerves, Chiasma, tracts). Calcification is commonly seen in most of the craniopharyngiomas with typical egg shell pattern. Normally it cannot disseminate but move around the visual structures of the brain causing compressive effects. Craniopharyngioma is believed to originate from remnants of rathkes cleft cells. Main Clinical manifestations are endocrinopathies (Diabetes insipidus due to low ADH, Growth retardation due to decreased growth hormone level, Hypothyroidism) due to derrangement in hormone levels of pituitary gland and visual impairment due to compression of anterior visual structures like optic nerves,

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Chiasma and optic tracts. Clinically presents as decreased visual acuity, visual field defects, papilledema or optic atrophy. Children may present with obesity and excessive food intake. Other clinical presentations may be symptoms of raised Intracranial pressure like headache and vomiting. Diagnosis is based on clinical assessment, Pituitary hormonal profile and radiological investigations (MRI Brain with and without contrast). Diagnosis is confirmed by excisional biopsy.[3,5-8]

The treatment options can be divided into minimal invasive procedures and invasive procedures. Minimal invasive procedures include Ventriculoperitoneal shunting for acute hydrocephalus, Putting an ommaya reservoir for a large, recurrent cystic craniopharyngioma. Invasive procedures can be radical resection(100%) of lesion, Near total resection(90-99%) or subtotal resection(50-90%).Commonly used surgical approach is Pterional craniotomy also called Frontotemporal craniotomy. Right sided pterional craniotomy is preferred because of non-eloquent side. Commonly used windows are inter-optic window,optico-carotid window and lateral to carotid window. Tumors can be approached by either of these windows during surgery. Extent of resection depends on attachment of tumor to eloquent areas like optic chiasma[7]. Stereotactic radiation therapy can be another treatment option which can help to stop tumor to develop again or slow the growth of tumor. Post Operative consultation with endocrinologist is necessary for possible hormonal imbalance.[3,4,5,6,7,8,9]

MATERIALAND METHODS

Study design: Observational descriptive case series study.

Place and duration of study: The study was performed from January 2017 to June 2018(18 Months duration) at Department of Neurosurgery, Lady Reading Hospital Peshawar.

Study Setting: Department of Neurosurgery LRH is very well known due to its expertise in skull-base surgeries, cerebrovascular diseases, pituitary tumors, Gliomas, Meningiomas, acoustic tumors, Spinal tumors, Spinal Reconstrution and neuro-endoscopy. The ethical approval was taken from Ethical Review Board (ERB) of hospital. Diagnosis was made by clinical assessment (Visual acuity assesment, Visual field assesment, Fundoscopy & Radiological investigations like MRI brain with and without contrast. The morphological relationship of the tumor to the optic chiasm, the degree of circumferential endorsement for the optic nerve, and assault of the optic appartus each require careful preoperative attention, generally best appreciated on coronal thin-slice T2-weighted MR images. Pre operative Pituitary Hormonal profile and perimetry was done. The Changes Of Visual Function (Visual Acuity And Field) Of The Patients Were Assessed Preoperatively And Postoperatively By Snellen Chart And Confrontation Method Respectively. So ophthalmological examination was the main assessment tool in our study preoperatively as well as post operatively. This was the standard clinical assessment performed in ophthalmogical department too.A proforma was designed for data collection, Paired data Of patients were Compared and the factors that influence on this change were analysed. SPSS version 17 was used for data analysis.

Inclusion criteria:

1) Newly Diagnosed Cases
2) Admitted via out patient department (OPD)
3) Operated Via Pterional Approach

Exclusion criteria:

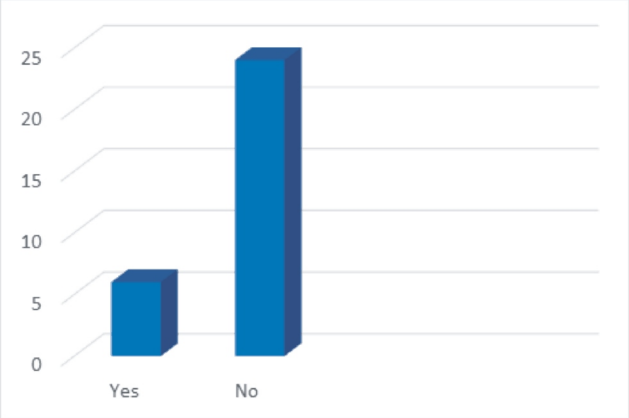
1) Recurrent Cases
2) Presented In Crisis Like Acute Hydrocephalus
3) Operated Via Other Approaches

RESULTS

Total number of patients were (30) with Male to female ratio was 1.5:1.Age of patients were Ranging from 4 year to 62 years (mean 35 years). There were 23 Children (76.6%) and 7 Adults (23.3%).Out of 30 patients, 21 patients(70%) presented with visual disturbance and 9 patients (30%) had non opthalmogical symptoms. Optic atrophy was seen in 6 patients (20%) pre-operatively. Per operatively tumor was found in suprasellar area in 24 patients(80%) and in both supra+infrasellar area in 6 patients(20%). Tumor size was less than 3cm in 19 patients(63.3%) and more than 3cm in 11 patients(36.6%).Morphology per operatively was cystic in 19 patients(63.3%), solid in 5 patients(16.6%) and both solid and cystic in 6 patients(20%). Calcification in tumor was seen in 16 patients(53.3%). Gross total resection(GTR) of tumor was done in only 21 patients(70%). Post-operative follow up assessment of visual status showed that (50%) of patients improved.

Graphs and tables are given below.

GRAPH: (CLINICAL PRESENTATION OF PATIENTS PRE OPERATIVELY)



PIC :CT BRAIN SHOWING CYSTIC CRANIOPHARYNGIOMA WITH CALCIFICATION IN CAPSULE

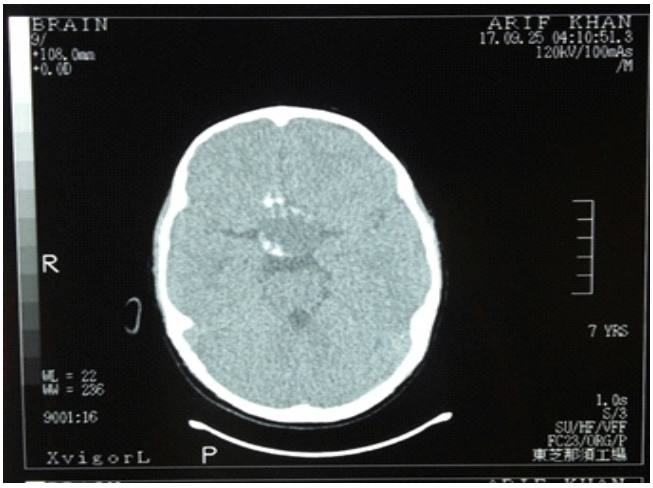


TABLE 1. TUMOR SIZE

TUMOR SIZE	NUMBER OF PTS
LESS THAN 3CM	19/30
MORE THAN 3 CM	11/30

TABLE 2. TUMOR CONSISTENCY PEROPERATIVELY

PREOPERATIVE VISUAL STATUS	POSTOPERATIVE VISUAL STATUS	NO OF PTS
DECREASED(N=21)	IMPROVED	15
	NO CHANGE	6
NORMAL(N=9)	NO CHANGE	7
	DECREASED	2

TABLE 3. TUMOR LOCATION

TUMOR CONSISTENSY PEROPERATIVELY	NO OF PTS
SOLID	5/30
CYSTIC	19/30
SOLID AND CYSTIC	6/30

TABLE 4. EXTENT OF RESECTION

TUMOR LOCATION	NO OF PTS
SUPRASELLAR	24/30
SELLR AND SUPRASELLAR	6/30

TABLE NO 5. VISUAL OUT COME

EXTENT OF RESECTION	NO OF PTS
GROSS TOTAL RESECTION(GTR)	21/30
NEAR TOTAL RESECTION(NTR)	5/30
SUBTOTAL RESECTION(STR)	4/30

DISCUSSION

Craniopharyngiomas is a benign tumor histologically but due to encroachment to surrounding important neurovascular structures make it malignant in behaviour. It has high rate of recurrence after subtotal resection. The prevalence of this tumor is 2/100,000[11,12.] Tumor spread to different locations in sellar/suprasellar area that result in endocrinopathy, hypothalamic and visual dysfunction. In this study ,it was observed that children commonly presented with visual impairment as compared to adults, this is according to literatures [13,14.] The Visual impairment was in the form of decreased visual acuity and bitemporal hemianopia in most of the patients. Patients with optic atrophy preoperatively showed poor response to surgery in terms of visual improvement. Per operatively tumor location was also important predictor in visual outcome as good outcome was seen in those with infrasellar location as compared to suprasellar located tumors. Similarly cystic tumors had good visual outcome as compared to solid tumors with variable cystic components. Calcification of tumor results in adherence of lesion to surrounding Neurovascular structures resulted in poor visual outcome as compaed to non calcified tumors.[16,17]

Extent of resection was categorized as Gross total resection(Resection of tumor completely 100%),Near total resection (Resction of 90-99% tumor), Subtotal resection (Resection of 50-90% tumor), Debulking (Resection of less than 50% tumor), Biopsy only. Extent of resection depends on adherence of tumor to surrounding neurovascular structures. Recurrence is minimal with GTR and NTR so that's why in our study we resected the tumor as much as possible[20.21]. At the end statistical analysis of study proved that visual improvement was (50%). The most important aspect of Pterional craniotomy is appropriately not only for vascular pathology originating the circle of Willis but also for lesions located in or around the cavernous sinus, Sellar/ parasellar and sub frontal regions.

CONCLUSION

Post operatively visual outcome of craniopharyngioma patients depends on all factors including patient-related factors, Surgery-related factors and Tumor-related factors. Long-term follow up of postoperative visual function is necessary for more exact defining the factors influencing on the visual outcome after surgical removal ofcraniopharyngiomas.

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