



## ETIOLOGICAL EVALUATION OF PROPTOSIS- A PROSPECTIVE STUDY

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**ABSTRACT** Proptosis is defined as the abnormal protrusion of the eyeball beyond the orbital margins, with the patient looking straight ahead and it is the most common manifestation of the orbital disease. The normal value of protrusion ranges from 10-20mm in both eyes and the difference does not exceed 2mm. Aim: To assess the incidence of proptosis in the different sexes, age-groups and the various etiologies of proptosis using B scan USG. **Materials and methods:** The study was conducted at RIO, Gauhati Medical College Hospital (GMCH), for a period of 1 year from June 2020-May 2021. A total of 50 cases of proptosis were selected for the study. In all the cases, clinical examination as well as B Scan ultrasonography were done. **Results:** Maximum incidence was found in the age group of above 40 years, followed by 0-10 years. Male:Female ratio was found to be 1.38:1. In this study, 42 cases had presented with unilateral proptosis (84%) whereas 8 cases had presented with bilateral proptosis (16%). The final etiological classification of the lesion shows 40% neoplastic, 30% inflammatory, 18% endocrine, 4% vascular and 2% traumatic lesions.

**KEYWORDS :** Proptosis, USG Bscan, orbit**INTRODUCTION**

Proptosis is defined as the abnormal protrusion of the eyeball beyond the orbital margins, with the patient looking straight ahead.[1] It is the most common manifestation of the orbital disease.[2] Henderson has reserved the use of word 'exophthalmos' for those cases of proptosis which are secondary to endocrinological dysfunction.[3] A lesion in the intra-conal region produces axial proptosis and lesions in the extra-conal region produces eccentric proptosis.[1] Asymmetry of more than 2 mm between the two eyes of any given patient is considered abnormal. [4]The normal value of protrusion ranges from 10-20mm in both eyes and the difference does not exceed 2mm.[4]

The anatomical proximity of the orbit to the cranial cavity and paranasal sinuses, the visual importance of the eye and the diversity of the etiological factors have made proptosis a subject of multiple disciplines.[5] To evaluate the orbital lesion by palpation and auscultation, and secondary ocular changes like proptosis, extra ocular muscle involvement, pupillary abnormalities, visual loss and fundus abnormalities, sometimes the ophthalmologist may need to consult other specialists like neurologist, neurosurgeon, endocrinologist, otorhinolaryngologist, radiologist, radiotherapist, pathologist and maxio-facial plastic surgeon in order to come to a proper diagnosis and management of the lesion. [6]

During the evaluation of a case of proptosis even after recognizing the likelihood of the presence of a pathological process, its identification and evaluation are dependent upon the visualization of the affected structure. In the past, even the best clinician had no choice but to resort to surgical exploration to diagnose many orbital diseases.

Since the development of the newer sophisticated techniques like USG, CT scan and MRI have become available, deeper structures can be visualized directly. The era of continued exploratory surgery for disease characterization is unquestionable over interpretation of sophisticated imaging technique.[7]

**AIM OF STUDY**

To assess the incidence of proptosis in the different sexes, age-groups and the various etiologies of proptosis using B scan USG.

**MATERIALS AND METHODS**

The study was conducted at RIO, Gauhati Medical College Hospital (GMCH), for a period of 1 year from June 2020-May 2021. A total of 50 cases of proptosis were selected for the study. Ethical clearance was obtained from the hospital ethics committee and

informed consent of the patients as well as parents (in case of children) was also taken. Hertel's exophthalmometer was used for measuring the distance between the lateral orbital rim and the most anterior position of the cornea. The reading of eyes was taken, and this gives the measure of proptosis. In general, measurements between the two eyes should be equal. If the measurements are different by 2 or more millimetres, the patient should undergo additional evaluation. Visual acuity and detailed local ophthalmological examination (under general anaesthesia if needed) which includes inspection, palpation, auscultation, intraocular pressure using schiottz tonometer and applanation tonometer, fundus examination and indirect ophthalmoscopy and slit lamp examination was done and systemically recorded. An etiopathological diagnosis was done on the basis of local clinical examination, laboratory tests, relevant radiological examinations, ultrasonographic study, CT scan, MRI imaging, FNAC and biopsy. According to the etiopathological diagnosis, a management strategy was individualized for each case. Follow-up of the cases were done in definitive time intervals.

**INCLUSION CRITERIA :**

1. All proptosis cases of any age group of both sexes.
2. All cases attending the OPD or admitted as indoor patient and those referred to the Department of Ophthalmology, from the other departments of GMCH, for example, Otorhinolaryngology, Medicine, Paediatrics etc.

**EXCLUSION CRITERIA :**

1. Cases presenting with pseudoproptosis were not included in the study group.
2. Clinically established cases of proptosis occurring due to retro bulbar haemorrhage during administration of anaesthesia or any other local therapeutic intervention.
3. Proptosis with severely traumatised eye were not included.

In all the cases clinical examination as well as B Scan ultrasonography was done. Hertel's exophthalmometer was used for the study.

**RESULTS****Table I. Age Distribution Of The Patient Studied**

AGE GROUP(in years)	Total Number of cases	Percentage
0-10 Yrs	13	26%
11-19 yrs	7	14%
20-29 yrs	8	16%
30-39 yrs	5	10%

>40 yrs	17	34%
TOTAL	50	100%

In the present study, it was found that maximum incidence was in the age group of above 40 years. The next affected age group was between 0-10 years. The youngest patient was 2 years old, and the oldest patient was 65 years old.

**Table II: Sex Distribution Of The Patient Studied**

Sex	Total Number of cases	Percentage
Male	29	58
Female	21	42

Of the total number of Proptosis cases studied, 58% patients were male and only 42% were females. So, the male: female ratio is 1.38:1.

**Table III: Laterality Of Proptosis**

LATERALITY OF PROPTOSIS	NO OF CASES	PERCENTAGE
UNILATERAL	42	84
BILATERAL	8	16

In this study, 42 cases had presented with unilateral proptosis (84%) whereas 8 cases had presented with bilateral proptosis(16%). Out of the cases of unilateral proptosis, the right eye was affected in 25 cases and left eye was in 17 cases.

**Table-IV: Type Of (AXIAL & NON-AXIAL) Proptosis**

FROM HISTORY PROPTOSIS	NUMBER OF CASES	PERCENTAGE
Axial	36	72
Non-Axial or Eccentric	14	28

In the present study, proptosis was axial in 36 cases which is (72%) and in 14 cases (28%) the proptosis was eccentric (non-axial) in type. In some cases of non-axial proptosis, there was more displacement of the globe than actual proptosis. Proptosis was acute in the case with orbital cellulites.

**Table V: Clinical Diagnosis Of The Patients Studied**

CLINICAL DIAGNOSIS	NUMBER OF CASES	PERCENTAGE%
Retinoblastoma with trans scleral spread	7	14
Orbital cellulites	5	10
Retrobulbar mass lesion (etiology uncertain)	4	8
Thyroid exophthalmos	9	18
Retrobulbar inflammatory lesion (pseudotumour)	7	14
Metastatic lesions from other sites	8	16
Vascular lesions	1	2
Extension of mass lesion from PNS and nasopharynx	3	6
Haematoma	2	4
Orbital abscess	1	2
Dermoid cyst	1	2
Haemangioma	2	4

**Table VI: Showing The Distribution Of Etiological Factors Causing Proptosis In The Case Studied**

ETIOLOGICAL GROUP	TOTAL CASES	% In each group
I).NEOPLASTIC GROUP	6	40
1.Retinoblastoma with orbital extension.		
2.Secondary invasion from nose, PNS and Nasopharynx.	3	
3.Metastatic deposits in the orbit from other sites.	4	
5.Dermoid cyst	1	
6.Non-hodgkin's lymphoma	4	
7.Lacrimal gland tumor	1	
8.Rhabdomyosarcoma	1	
II)INFLAMMATORY GROUP	9	30
1.Pseudotumor		

2.Orbital cellulitis	4	
3.Orbital abscess.	1	
4.Eosinophilic granuloma of orbit	1	
III) TRAUMATIC	2	4
Orbital hematoma		
IV)ENDOCRINE	9	18
Thyrotoxic exophthalmos		
V)VASCULAR	1	6
Orbital varices		
Haemangioma	2	
VI)MISCELLANEOUS	1	2
Buphthalmos		
TOTAL	50	

On comparing the clinical diagnosis and B-scan ultrasonographic diagnosis, it has been found that only 6 out of 50 cases were not interpreted correctly by B-scan ultrasonography. Rest 44 cases were all correctly interpreted by B-scan ultrasonography. So, in the present study, the diagnostic accuracy of B-scan ultrasonography for evaluation of proptosis can be calculated as  $(44/50) \times 100\% = 88\%$ . Therefore, the diagnostic accuracy or the predictive value of a positive result of B-scan ultrasonography in evaluation of proptosis in this study has been found to be 88%.

**DISCUSSIONS :**

**AGE:**

In the present study maximum number of patients were above 40 years of age (34%) followed by below 10 years of age (26%). This may be because neoplasms are seen to be more common, in our study.

The age group in the present study was comparable to the studies conducted by Susan Dsouza et al[8] and Chandana Chakraborti et al [9]who found majority of the cases to be 24% and 57% in the age group above 60 years and 50-60 years respectively.

But the study conducted by Mohammed Ather et al. found that majority were in the age group of 20-29 years that accounted for 30% of total cases which differs from our study because the most common cause of proptosis in his study was thyroid related orbitopathy.[10]

The findings of the present study is mostly comparable with the study conducted by Chandana Chakraborti et al.

**SEX:**

In the present study 29 (58%) of the cases were male ,whereas females accounted for 21 ( 42%) of the cases . The male -female ratio was 1.38:1 which correlated with the study of Khalid Farooq et al. where male to female ratio was 1.23:1[11]. Mohammed Ather et al in his study found out that (54%) were males and (46%) were females[10]. Chandana Chakraborti et al. found in their study that male: female ratio was 1.47:1 [9]. Susan D Souza et al. had found 18 were males (72%) and 7 were females (28%). [8] In all the studies mentioned above, there were greater number of males who were affected. The findings of the present study is mostly comparable with the study conducted by Chandana et al.

**LATERALITY :**

In this study, 42 cases had presented with unilateral proptosis (84%) whereas 8 cases had presented with bilateral proptosis(16%). Out of the cases of unilateral proptosis, the right eye was affected in 25 cases and left eye was in 17 cases. Khalid Farooq et al. also found a greater number of unilateral proptosis cases in his study (88.5%).[11] Similar findings were found by Chandana Chakraborti et al. and Mohammed Ather et al. where unilateral proptosis was found to be 82.39% and 88% respectively.[9,10] The findings of the present study is mostly comparable with the study conducted by Chandana Chakraborti et al.

**TYPE OF PROPTOSIS :**

In the present study, proptosis was axial in 36 cases (72%) and in 14 cases (28%) the proptosis was eccentric (non-axial) in type. In the studies conducted by Mohammed Ather et al. and Susan Dsouza et al. the axial proptosis was more common with 56% and 60% respectively.[10,8] But in the study conducted by Chandana Chakraborti et al. eccentric proptosis was found to be more common contradicting the findings of the present study.[9] In the present study, retinoblastoma was the most common cause of proptosis in paediatric age group because of which axial proptosis was more common in our study. Hence the variation between these two studies.

**ETIOLOGY:**

The most common cause of proptosis in our study was neoplasms which is 40%, followed by inflammation i.e. 30%, followed by thyroid ophthalmopathy cases (18%). Similar findings were described by Chandana Chakraborti et al. [9], Masud et al. [12] and Sabharwal et al. [13] which showed tumor as the most common cause of proptosis. In contrast to which, the most common cause of proptosis in the study conducted by Mohammed Ather et al. and Susan Dsouza et al. were inflammatory disorders [10,8]. In our study, retinoblastoma was the most common ocular tumour in children. Sindhu, K et al. also concluded in their study that the causes of unilateral proptosis in a child include retinoblastoma in the first 5 years of life followed by infective orbital cellulitis. [14] But Altonbary Y et al. in their study found the most common cause of proptosis among children was orbital cellulitis, followed by retinoblastoma which is different from ours. [15] In the present study, most of the clinically uncertain cases were suspected to have retrobulbar mass lesion, which accounted for 8%. The orbital extension of retinoblastoma could not be confirmed clinically. Only the cases with orbital cellulitis and orbital abscess were clinically diagnosed with some degree of confidence. At least 21 cases (42%) could be diagnosed by clinical examination and routine X-ray alone. The rest 58% cases needed further investigations. The findings of the present study is mostly comparable with study conducted by Chandana Chakraborti et al.

**Proptosis related with ENT disorder**

ENT examinations were done in all cases and were found to be very valuable in excluding ENT associated conditions. This is because of the anatomical relation and fragility of the partitioning wall, so any growth in the nasal and paranasal spaces is likely to invade the orbit to cause proptosis.

**CONCLUSION :**

Proptosis is a multidisciplinary problem and hence different specialities need to collaborate to reach a final diagnosis. The final etiological classification of the lesion shows 40% neoplastic, 30% inflammatory, 4% vascular, 18% endocrine, 2% traumatic lesions. As most common age group in our study was more than 40 years, hence it explains neoplasm being the most common cause of proptosis in this study. B-scan ultrasonography was found to be a reliable, atraumatic, noninvasive and nonhazardous method of examination of the orbit for the evaluation of proptosis. It has also been found to be cost effective and physiologically acceptable to patients. Though radiological investigations are valuable in evaluating a case of proptosis, but histopathological examination provides a definitive diagnosis of the exact etiology.

**Conflict of Interest:**

**There are no conflict of interest**

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