EVALUATION OF PROPTOSIS BY USING COMPUTED TOMOGRAPHY IN A TERTIARY CARE CENTER, BURLA, SAMBALPUR, ODISHA

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ABSTRACT

BACKGROUND

Proptosis is defined as the abnormal anterior protrusion of the globe beyond the orbital margins.[1] It is an important clinical manifestation of various orbital as well as systemic disorders. Aetiology ranging from infection to malignant tumours, among which space occupying lesions within the orbits are the most important. Proptosis is defined as an abnormal protrusion of the eyeball.

MATERIALS AND METHODS

A total of 32 patients referred from various departments mainly from ophthalmology and medicine with history and clinical features suggestive of proptosis were evaluated in our department and after proper history taking and clinical examination, Computed Tomography (CT) scan was done.

RESULTS

The age of the patients ranged from 1-55 years. Associated chief complaints in case of proptosis were in decreasing order from pain / headache, restricted eye movement, diminished vision and diplopia. Mass lesions (46.87%) were the most common cause of proptosis followed by inflammatory lesions (37.5%). Trauma vascular lesions and congenital conditions were infrequent causes of proptosis. In children, common causes of proptosis were retinoblastoma (35.71%) and orbital cellulitis (28.57%) and in adults the common causes were thyroid ophthalmopathy (22.22%), trauma (16.66%) and pseudo-tumour (16.66%).

CONCLUSION

Mass lesions (46.87%) were the most common cause of proptosis followed by inflammatory lesions (37.5%). CT scanning should be the chief investigation in evaluation of lesions causing proptosis. It is the most useful in detecting characterising and determining the extent of disease process. The overall accuracy of CT scan in diagnosis of proptosis is 96.87%.

KEYWORDS

Proptosis, Computed Tomography, Burla.

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BACKGROUND

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The retro bulbar space is clinically inaccessible. Thus, diagnostic evaluation of proptosis is essential. Until 1970's plain x - ray and ultrasound were used to evaluate proptosis. X-rays were unable to image the soft tissues. Ultrasound though can image the soft tissue but could not be used in assessment of posterior orbital lesions.

Computed tomography (CT) scan has superior contrast resolution and delineates bony as well as the soft tissues structures with better resolution with intra orbital fat acting as natural contrast.

Though CT scan uses ionizing radiation, its easy availability, short scan time, low motion artefacts, low cost, better visualization of bony lesions and calcification, scanning in axial and coronal planes, ability to scan the adjacent para nasal sinuses and surrounding structures has made CT scan an important diagnostic tool for evaluation of proptosis.[2]

CT scan has become the main investigation in evaluation of orbital lesions. Hence, this study was undertaken with an objective to evaluate the role of CT in detection of lesions causing proptosis.

MATERIALS AND METHODS

The Present study was carried out in the department of radiodiagnosis, V.S.S. Medical College and Hospital, Burla, Sambalpur, Orissa between December 2003 to December 2005. The patients referred from various departments mainly from ophthalmology and medicine with history and clinical features suggestive of proptosis were evaluated in our department and after proper history taking and clinical examination, CT scan was done.

Altogether 32 patients of different age groups of either sex were studied in detail. In all these 32 patients, CT scan was done and the results were analysed and compared later. CT examination was done with Hitachi third generation whole body CT scanner in all these patients. All the cases subjected to non-enhanced and contrast enhanced CT. In axial and coronal planes, non-enhanced images of the orbit initially were obtained by using 3 mm collimation. The axial scans were taken with gantry angulation of 10 to 15 degrees to the orbito-meatal line. Then 2 to 3 mm sections were taken after giving intravenous (IV) contrast medium.

A non-ionic iodine contrast containing dye was given at a dose of 1 ml /Kg body weight in adults and 2 ml/kg body weight in children. The IV contrast bolus was given in the superficial vein of the arm. Use of non-ionic 3 contrast was limited to patients in whom use of ionic contrast was considered dangerous. The paediatric patients were given sedatives (syrup pedichloryl and injection diazepam) before the scan. Data was entered in excel sheet and results were expressed in terms of number and percentage.

RESULTS

In the present study, we included 32 study subjects with history and clinical feature suggestive of proptosis.

Age	Number of Subjects
1-10	10
11-20	4
21-30	5
31-40	7
41-50	3
>50 Yrs.	3
Total	**32**

Table 1. Distribution of Study Subjects Based on their Age

There were two peak age group of proptosis was observed in the study.

Age	Male	Female	Total
1-10	5	5	10
11-20	2	2	4
21-30	2	3	5
31-40	3	4	7
41-50	2	1	3
>50 Yrs.	1	2	3
Total	**15**	**17**	**32**

Table 2. Distribution of Study Subjects Based on their Age and Gender

The incidence of proptosis was found to be equally distributed among males (47%) and females (53%) in this study group.

Chief Complaints	Number of Cases	Percentage
Pain / Headache	20	62.50%
Restricted eye movement	16	50.00%
Diminished Vision	15	46.87%
Diploma	03	9.37%

Table 3. Associated Chief Complaints in Case of Proptosis

Associated chief complaints in case of proptosis were in decreasing order of pain/headache, restricted eye movement, diminished vision and diplopia.

Aetiology	Number of Cases	Percentage
Inflammatory	12	37.5
Mass Lesions	15	46.87
Trauma	03	9.37
Vascular Lesions	02	6.25
Congenital	00	00

Table 4. Frequency of Aetiological Lesions Causing Proptosis

Mass lesions accounted most of the cases of proptosis in this study about 47%, followed by inflammatory lesions 37.5%. Trauma and vascular lesions accounted for the rest.

Aetiology in Children	Number of Cases	Percentage
Retinoblastoma	5	35.71
Orbital cellulitis	4	28.57
Optic nerve glioma	1	7.14
Rhabdomyosarcoma	1	7.14
Fibrous dysplasia	1	7.14
Pseudotumour	1	7.14
Lymphangioma	1	7.14

Table 5. Frequency of Aetiological Lesions Causing Proptosis in Children

In this study retinoblastoma was the most common cause of proptosis in children accounting for about 36% of the cases, followed by orbital cellulitis, which accounted for about 29 % of proptosis in this study.

Aetiology in Adults	Number of Cases	Percentage
Inflammatory condition	7	38.88
Thyroid ophthalmopathy	4	22.22
Pseudotumour	3	16.66
Orbital mass	7	38.88
Metastasis	2	11.11
Optic sheath meningioma	1	5.55
Lymphoma	1	5.55
Mucocele	1	5.55
Sphenoid wing meningioma	1	5.55
Lacrimal gland pleomorphic adenoma	1	5.55
Trauma	3	16.66
Vascular Lesions	1	5.55

Table 6. Frequency of Aetiological Lesions Causing Proptosis in Adults

Inflammatory lesions accounted for 7 cases of proptosis (38.88%) and orbital mass lesions accounted for the same number of cases that is 7 (38.88%). Trauma and vascular lesions accounts for the rest of the cases.

DISCUSSION

Proptosis is defined as the anterior displacement of one or both globes within the bony orbit. In adults, there is normal ocular protrusion of the eye ball which is measured (with a Hertel exophthalmometer) from the lateral orbital rim to the corneal apex is 14 to 21 mm. The severity of proptosis can be measured with a plastic rule resting on the lateral orbital margin or a Hertel exophthalmometer. Readings greater than 21 mm are indicative of proptosis and a difference of 2 mm between the two eyes is suspicious regardless of the absolute value.

Proptosis is graded into 3 grades according to the amount of protrusion

Mild	21-23 mm
Moderate	24-27 mm
Severe	28 mm or more

Classification of the Causes of Proptosis

Common causes of proptosis can be classified differently. However classification according to the site of involvement will help to give the differential diagnosis in the CT scan.

Intraconal Causes	**Conal Lesions**
Vascular - Cavernous	Thyroid ophthalmopathy
Haemangioma	Orbital pseudotumour
Hemangioblastoma	Lymphoma
Schwannoma	Cellulitis
Orbital pseudotumour	Metastasis
Metastasis	Carotid cavernous fistula
Lymphoma	
Haematoma	
Extraconal Lesions	**Causes of Optic Nerve Complex Enlargement**
Cellulitis, abscess	Tumour
Lacrimal gland tumors	Optic nerve glioma
Dermoid, epidermoid	Meningioma
Pseudotumour	Metastasis
Mucocele	Leukaemia
Granulomatous disease	Non-neoplastic causes
Metastasis	Grave's ophthalmopathy
Meningioma	Orbital pseudotumor
Rhabdomyosarcoma	Cysticercosis
Haematoma	Central retinal vein occlusion
Lymphangioma	Traumatic haematoma of optic nerve

Thyroid Expophthalmos

It is the most common cause of proptosis and occurs both in hyperthyroid and euthyroid patients and may precede clinical hyperthyroidism.[3,4]

Trokel et al stated that the condition is immunological in nature and proptosis occurs when the extra ocular muscles are enlarged by infiltration of lymphocytes, plasmocytes, mast cells and deposition of mucopolysaccharides.[5]

Orbital Pseudotumour

Idiopathic orbital inflammation/pseudotumour represent a non-granulomatous inflammatory process in orbit with no known local or systemic causes.[6]

It is one of the most common causes of intra orbital mass accounting for 6.3% of all orbital masses.[6]

Optic Glioma

Optic nerve gliomas represent 4% of all intra-orbital tumours and 66% of all primary optic nerve tumours. The peak age of occurrence is between 2-8 years and female to male predominance is 3:2. 70% of gliomas are diagnosed in 1st decade. They can be solitary or component of neurofibromatosis.

Retinoblastoma

Retinoblastoma is the most common intra-ocular malignancy of childhood.[7]

In 25-33% of the patients it is bilateral and represents autosomal dominant pattern of inheritance with variable penetration.[8]

32 cases of proptosis were investigated by CT scan between the period December 2003 to December 2005 in department of radio diagnosis, V.S.S. Medical College and Hospital, Burla. There were 15 males and 17 females in the study group. Age of the patients ranged from one year to 55 years.

Table number 1, shows the age distribution of 32 cases of proptosis subjected to CT scan. Two peak age incidence were observed one below 10 years and another between 31-40 years. Table number 2, shows the sex distribution of 32 cases of proptosis subjected to CT scan. The incidence of proptosis was found to be almost equally distributed among males and females. Kaimbo DK and associates in their study of proptosis in 129 cases in Zaire and observed that 79 (61%) cases were males and 50 (39%) were females and majority of the cases were between 30-50 years. The discrepancy with the present study could be due to the geographical factor and small sample size in this study.

In the present study, the chief associated clinical features along with proptosis in decreasing order of frequency were pain/headache (62.5%), restricted eye movements (50%), diminished vision (46.87%) and diplopia (9.37%).

The present findings correlate well with the study of Kaimbo and associates in which pain and headache was the most frequent clinical feature associated with proptosis.[9]

Regarding the frequency of different lesions causing proptosis, the mass lesions accounted for 46.87% cases of proptosis followed by inflammatory lesions (37.5%), trauma (9.37%), and vascular lesions (6.25%). No cases of congenital disorders were seen in the current study. This correlates with the study of Kaimbo and associates in which mass lesions accounted for 40% of cases and inflammatory disorders for 36% and study of Al Salem and associations in which inflammatory disorders accounted for 43% of cases.[9,10]

Table 5, shows the frequency of different aetiology causing proptosis in children. Retinoblastoma (35.71%) was the most common cause followed by orbital cellulitis (28.57 %). Sindhu and associates in a study found orbital cellulitis (38%) as the most common cause of proptosis in children[11].

Table 6, shows the different aetiology of proptosis in adults. Inflammatory lesions (38.88%) accounted for maximum number of cases of proptosis, so where the mass lesions (38.88%) also accounted for the same and trauma accounted for (13.3%). In the study of Richard Dallow and associates inflammatory lesions accounted for 51% of cases followed by mass lesions (31%).[12]

CONCLUSION

Mass lesions (46.87%) were the most common cause of proptosis followed by inflammatory lesions (37.5%). In children, common causes of proptosis were Retinoblastoma (35.71%) and orbital cellulitis (28.57%) and in adults the common causes were thyroid Ophthalmopathy (22.22%), trauma (16.66%) and pseudotumour (16.66%). CT scanning should be the chief investigation in evaluation of lesions causing proptosis. It is the most useful in detecting characterising and determining the extent of disease process. The overall accuracy of CT scan in diagnosis of proptosis is 96.87%.

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