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A Prospective Study on Associated Conditions of Vertical Deviation

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Abstract
Background: *Hypertropia is a condition of misalignment of the eyes where the visual axis of one eye is higher than the fellow fixating eye. Hypotropia is the similar condition focus being on the eye with the visual axis lower than the fellow fixating eye. Dissociated Vertical Deviation is a special type of hypertropia leading to slow upward drift of one or rarely both eyes usually when the patient is inattentive. Vertical Deviation may be congenital or acquired and misalignment is due to imbalance in extra ocular muscle function.*
Materials and Methods: *This is a prospective study conducted on 32 patients with clinical diagnosis of vertical deviation.*
Results: *32 cases with clinical diagnosis of Vertical Deviation were enrolled in this study. Esodeviation is the common associated deviation.*
Conclusion: *Superior oblique palsy was the frequent cause of hypertropia. Majority of them were congenital in origin. Majority presented with upward deviation of Right eye.*
Keywords: *Superior oblique palsy / Congenital fourth cranial nerve palsy, Inferior oblique over action, Inferior Rectus muscle palsy, Double elevator palsy.*

I. Introduction

The vertical rectus muscles and the oblique muscles control both the vertical position of the eyes as well as the torsional position (keeping the eyes straight when the head is tilted.

Hypertropia is a condition of misalignment of the eyes (strabismus), whereby the visual axis of one eye is higher than the fellow fixating eye. Hypotropia is the similar condition, focus being on the eye with the visual axis lower than the fellow fixating eye. Dissociated Vertical Deviation is a special type of hypertropia leading to slow upward drift of one or rarely both eyes, usually when the patient is inattentive.

Hypertropia may be either congenital or acquired, and misalignment is due to imbalance in extraocular muscle function. The superior rectus, inferior rectus, superior oblique, and inferior oblique muscles affect the vertical movement of the eyes. These muscles may be either paretic, restrictive (fibrosis) or overactive effect of the muscles. Congenital cases may have developmental abnormality due to abnormal muscle structure, usually muscle atrophy / hypertrophy or rarely, absence of the muscle and incorrect placement.

Specific & common causes include: Superior Oblique Palsy / Congenital fourth nerve palsy, Inferior Oblique overaction, Brown's Syndrome, Duane's Retraction Syndrome, Double elevator palsy, Fibrosis of rectus muscle in Graves Disease (most commonly inferior rectus is involved), Surgical trauma to the vertical muscles (e.g. during scleral buckling surgery or cataract surgery causing iatrogenic trauma to the vertical muscles).

Refractive errors such as hyperopia and Anisometropia may be associated abnormalities found in patients with vertical strabismus. The vertical miscoordination between the two eyes may lead to Strabismic amblyopia, (due to deprivation / suppression of the deviating eye), cosmetic defect (most noticed by parents of a young child and in photographs), Face turn, depending on presence of binocular vision in a particular gaze, diplopia or double vision - more seen in adults (maturity / plasticity of neural pathways) and suppression mechanisms of the brain in sorting out the images from the two eyes, Cyclotorsional deviation of the eyes (rotation around the visual axis), particularly when the root cause is an oblique muscle paresis causing the hypertropia.

II. Objectives

Prospective study of the associated conditions of vertical deviations such as esodeviation, exodeviation, age, sex, acquired conditions, congenital causes

III. Materials And Methods

This is a prospective study conducted, 32 patients with clinical diagnosis of vertical deviations attended to the outpatients department of Squint and Paediatric department of Sarojini Devi Eye Hospital were enrolled in this study. The incidence of associated conditions were analyzed and divided into categories.

1.1 Inclusion Criteria: Congenital and acquired vertical deviations.
1.2 Exclusion Criteria: Iatrogenic vertical deviations.

1.3 Methodology 1: It is a prospective study, a detailed study of the patients who were attended the orthoptic department was done regarding age, sex incidence, general and systemic examination was done. A complete orthoptic examination was performed. Routine laboratory investigations were done and investigations like X-Ray and CT Scan were done when indicated. Cases of clinical interest and diversity are presented as case reports. A detailed history was elucidated regarding mode of onset of squint, and history of any hereditary bearing was looked into. History of trauma, fever, diplopia, head posture and other relevant symptoms and signs were elucidated.

1.4 Methodology 2: Vision was recorded by snellen's chart and E-test for distance and near. Cover-uncover test was done to determine the type of deviation. Ocular movements were tested in all cardinal directions and nyrestrictions or over actions were noted.

S.No	AGE	MALE	FEMALE	TOTAL	Percentage
1.	6m-6yrs	01	02	03	9%
2.	7-14yrs	02	04	06	19%
3.	>14yrs	12	11	23	72%

1.5 Methodology 3: Angle of deviation was determined by Hirschberg test, Prismbar cover test, Krimsky's test, Worth's four dot test was done to know the presence of binocularity, Diplopia charting and Lees screen test were done, A cycloplegic refraction and fundus examination were done, DT was done when indicated under tropical anesthesia with 4% xylocaine drops.

IV. Results And Discussion

32 Cases with clinical diagnosis of vertical deviation were enrolled in this study.

Table No 1

Figure No 1

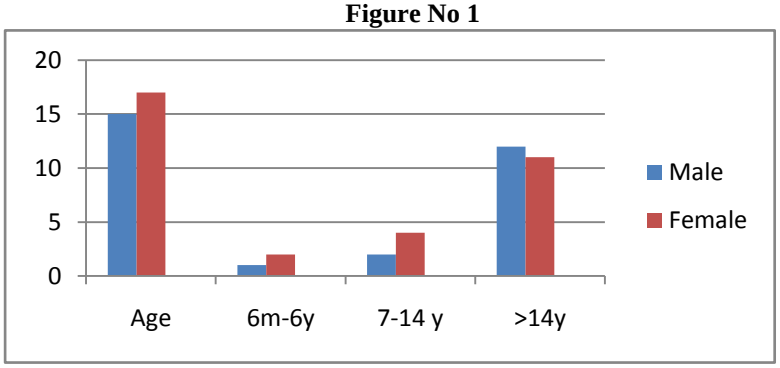

Table No 2 - Associated deviations

S.No	Type of Deviation	No of cases	Percentage
1.	Esodeviation	04	12%
2.	Exodeviation	03	9%

Esodeviation is the common associated deviation.

Figure No 2

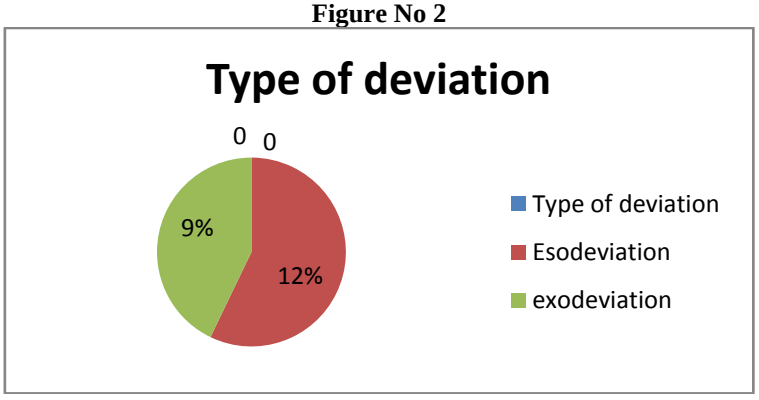

Table No 3 – Positive Family History

No of cases with positive family history of squint	Total no of cases	Percentage
02	32	6%

Figure No 3

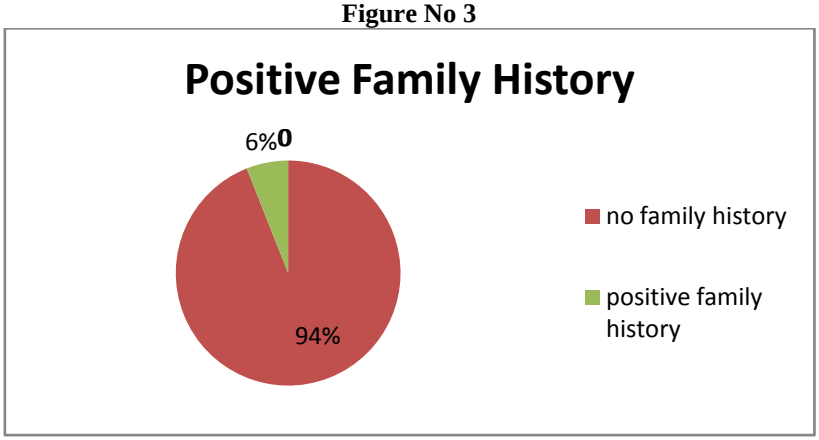

Table No 4- Laterality

Laterality	**No of cases**	**Percentage**
Right	**22**	**69%**
Left	**9**	**28%**

Figure No 4

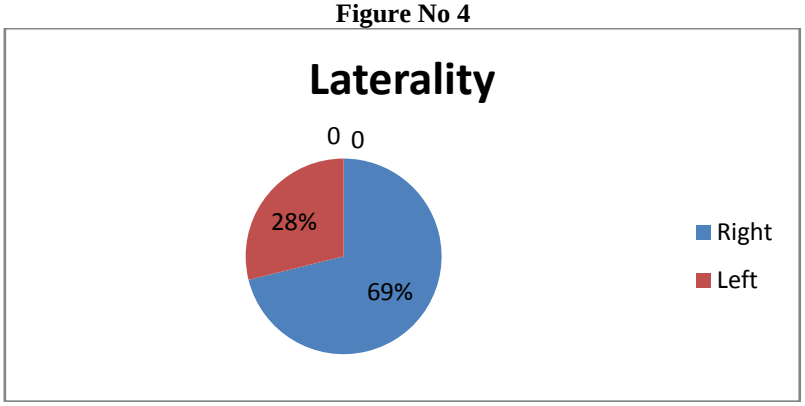

Table No 5 – Aetiology

S.No	**No of cases**	**Percentage**
Congenital	**19**	**59**
Acquired	**13**	**41**

Figure No 5

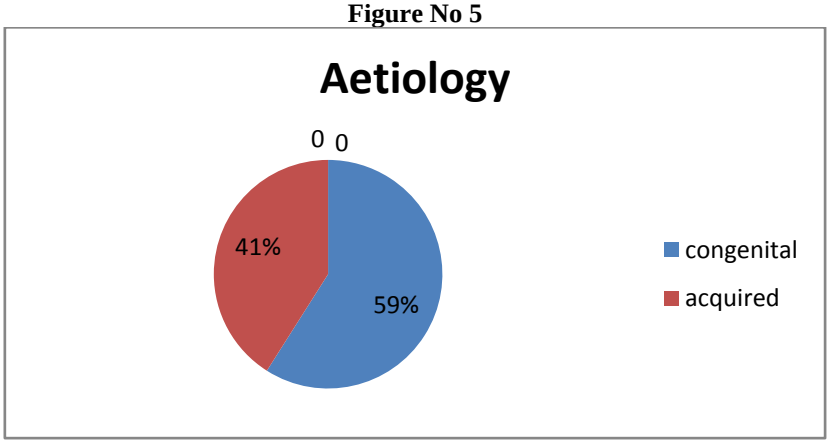

Table No 6– Types of vertical deviations

S.No	RHT	LHT	DVD
1.	22	08	02
percentage	69%	25%	6%

Table No 7– Causes

S.No	Due to overaction of muscles				Single muscle paralysis				Double elevator palsy	Restriction of muscle	Multiple muscle palsies (IIICN-Palsy)
	SR	IR	SO	IO	SR	IR	SO	IO			
1.	00	00	00	06	01	06	08	01	02	01	05
%				19	3	19	25	3	6	3	16

Table No 8- Causes and of under action over action

Description	Under action		Over action	
	Mechanical	Paralytic	Primary	Secondary
No of cases	01	23	06	00
Percentage	03%	72%	19%	

Table No 9– Refractive errors

S.No	Refractive error			
	Hyperopia	Myopia	Anisometropia	Ambloypia
1.	02	02	01	03
%	6	6	3	9

Table No 10– Systemic causes

S.No	Hyper tension	Diabetis mellitus	Trauma	Hyper telerosim	Billateral blepharo phimosis	Congenital progressive external ophthalmoplegia	naso phyringial fibroma
1.	03	04	06	01	01	01	01
%	9	12	19	3	3	3	3

V. Conclusion

Superior oblique palsy was the frequent cause of hypertropia. Majority of them were congenital in origin.Majority presented with upward deviation of Right eye. Esotropia was the frequent association. Trauma was also one of the important associated factors. Superior oblique was the frequently involved muscle followed by Inferior rectus in trauma. Majority of the patients were young adults. Incidence of vertical deviation is almost equal in males and females. Systemic causes are most frequent in old age.

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