Al-Nahrain University

College of medicine

Association between squint and refractive error in Al-Imamein Al-Kadhimein teaching hospital

Supervised by:

Dr. Hind Ahmed

F.I.B.M.S. (opth.)

Done by the student:

Gufran Muhammed

2018-2019

Acknowledgment

I offer my deep appreciation and sincere thankfulness to my supervisor, Dr. Hind Ahmed. This thesis has been accomplished with great help and participation from her, which has been a great mentor and inspirational throughout the work prosses. Her knowledge, availability, enthusiasm and patience have been vital for my development in this field of study.

Dedication

I would be honored to dedicate this humble effort for the patients who suffer from squint and refractive error as children and as they grow up, as I hope that we, doctors, can lift this world together and improve the medical technology and find answers for unsolved questions to guide the humanity for a better tomorrow.

Table of Contents

Abstract

Strabismus, more commonly known across-eyed or wall-eyed, is a vision condition in which a person cannot align both eyes simultaneously under normal conditions.

The main aim: To investigate the association between esotropia or exotropia and refractive error among patients Al-Imamain Al-Kadhmain teaching hospital over 4 months.

Patient and method: a case descriptive study involving the analyses of all patients who had strabismus and were presented at Al-Imamain Al-Kadhmain teaching hospital from February to April 2019. The information retrieved method age, gender, VA and Cyclorefraction.

Result: During the review period 30 patients were seen in the hospital. They were 18 males and 12 females. The percentage of hypermetropia in Esotropia were 83% and Myopia were 17%. The percentage of hypermetropia in Exotropia were 75% and Myopia were 25%. The common age group that was affected from 3-7 years old.

Conclusion: This study highlights the close association between refractive error and the prevalence of Esotropia and Exotropia with which should be considered when managing childhood refractive error.

Introduction

Refractive error

Refractive errors occur when the shape of the eye prevents light from focusing directly on the retina. The length of the eyeball (longer or shorter), changes in the shape of the cornea, or aging of the lens can cause refractive errors. [1]

Types of refractive error

Myopia, also called nearsightedness, is the inability to see distant objects clearly. Objects at a distance look blurred, making it difficult to read a school blackboard or street signs. Myopia occurs when refracted light is focused in front of the retina instead of onto the retina. This may occur if the eyeball has an elongated shape or if the cornea has too much curvature. [2]

Hyperopia, also called farsightedness, occurs when distant objects are easier to see clearly than nearby objects. If hyperopia is significant, vision may be blurry at any distance. Hyperopia occurs when light is refracted behind the retina instead of onto the retina. This may occur if the eyeball is too short or if there is too little curvature in the cornea. [2]

Astigmatism is blurred vision caused by an unusually shaped cornea. In people with astigmatism, the cornea is shaped more like a football or an egg than a sphere. [2]

Light that hits an eye with astigmatism is distorted and refracted to multiple focus points within the eye instead of on one focus point on the retina. Most of the time, people with astigmatism have difficulty seeing objects close up and far away. [2]

Cyclorefraction

Cycloplegic refraction is a procedure used to determine a person's refractive error by temporarily paralyzing the muscles that aid in focusing the eye. Cycloplegic eye drops are used to temporarily paralyze or relax the ciliary body, or focusing muscle, of the eyes.

Cycloplegic refraction is sometimes used when testing the vision of young children. Children sometimes subconsciously accommodate their eyes during an eye exam, making the results invalid. [3]

Strabismus

Strabismus is a common childhood ocular disorder. The manifest misalignment of the eyes often results in deficient binocular depth perception and even amblyopia. Besides these functional effects, there are psychological distresses because of strabismus, such as depression and anxiety, impaired self-esteem and self-confidence, unsatisfied interpersonal relationships and social prejudice Surgical or optical therapy is necessary in many patients with strabismus. [4]

The cause of strabismus has not yet been clearly understood and many factors may contribute. [4]

Types of strabismus

1. Esotropia (ET): The eyes are turned inwards (cross-eyed) all the time.

2. Exotropia (XT): The eyes are turned outwards (wall-eyed) all the time.

3. Eso/Exo-phoria: Phorias are eye deviations that are only present some of the time, usually under conditions of stress, illness, fatigue, or when binocular vision is interrupted. [5]

Esotropia

A convergent strabismus is termed an esotropia. Most patients with esotropia present before school age, generally between the ages of 2 and 3 years. Esotropia is often constant. In most cases, intermittent esotropia occurs initially in association with accommodative esotropia or decompensated esophoria without treatment, intermittent esotropia is likely to become constant. [6]

Early-onset esotropia

Up to the age of 4 months, infrequent episodes of convergence are normal but thereafter ocular misalignment is abnormal. Early-onset (congenital, essential, infantile) esotropia is an idiopathic esotropia developing within the first 6 months

of life in an otherwise normal infant with no significant refractive error and no limitation of ocular movements. [7]

Treatment

Early ocular alignment gives the best change of the child developing some degree of binocular function. Ideally, the eyes should be surgically aligned by the age of 12 months, and at the very latest by the age of 2 years, but only after amblyopia or significant refractive errors have been correct. [7]

Accommodative esotropia

Accommodative esotropia is divided into two subsections: Refractive accommodative esotropia and Non-refractive accommodative esotropia.

Refractive accommodative esotropia

In this type of accommodative esotropia, the AC/A ratio is normal and esotropia is a physiological response to excessive hypermetropia, usually between +2.00 and +7.00 D. The considerable degree of accommodation required to focus clearly on even a distant target is accompanied by a proportionate amount of convergence, which is beyond the patient's fusional divergence amplitude. It cannot therefore be controlled, and a manifest convergent squint result. The magnitude of the deviation varies little (usually <10 Δ) between distance and near. [7]

Treatment

It is by simple correction of his cycloplegic error with spectacles. [7]

Non-refractive accommodative esotropia

- High AC/A ratio.
- No significant refractive error
- So when the child normally accommodate to focus on a near target, there is excessive convergence resulting in esotropia for near. [7]
- **Treatment** is by canceling the need for accommodation with a bifocal glass (a+3) lens added to the lower segment of the glass. [7]

Sensory esotropia. A convergent strabismus resulting from visual deprivation or trauma in one eye that limits sensory fusion is classified as a sensory esotropia. [6]

Exotropia

Constant (early-onset) exotropia

1. Presentation is often at birth.

2. Signs

• Normal refraction.

• Large and constant angle.

• DVD may be present.

3. Neurological anomalies are frequently present, in contrast with infantile esotropia.

4. Treatment is mainly surgical and consists of lateral rectus recession and medial rectus resection.

5. Differential diagnosis is secondary exotropia which may conceal serious ocular pathology. [7]

Intermittent exotropia

In intermittent exotropia, the patient sometimes manifests diplopia, suppression, or anomalous retinal correspondence, and at other times, normal binocular alignment with good stereopsis. The period of strabismus and level of control are variable for each patient. Basic intermittent exotropia accounts for approximately 50 percent of all cases of intermittent exotropia, with convergence insufficiency and divergence excess making up the balance of cases in approximately equal proportions. Intermittent exotropia typically presents between the ages of 1 and 4 years. Without treatment over the years, intermittent exotropia may either progress (both in degree and the amount of time it is manifest), stay the same, or, in some cases, improve. It rarely deteriorates to constant exotropia and fusion and some fixation at distance is usually maintained. [6]

Treatment

1. Spectacle correction in myopic patients may, in some cases, control the deviation by stimulating accommodation, and with it, convergence. In some cases, overminus prescription may be useful.

2. Part-time occlusion of the deviating eye may improve control in some patients, and orthoptic exercises may be helpful for near exotropia.

3. Surgery is indicated if control is poor or is progressively deteriorating. Unilateral lateral rectus recession and medial rectus resection are generally preferred except in true distance exotropia when bilateral lateral rectus recessions are more usual. The exodeviations rarely completely eliminated by surgery. [7]

Sensory exotropia. A divergent strabismus resulting from a unilateral decrease in vision that disrupts fusion, sensory exotropia may be due to a sensory deficit such as uncorrected anisometropia, unilateral cataract, or other unilateral visual impairment. [6]

Aim of study

The aim of this study is to investigate the association between esotropia, exotropia and refractive error.

Patients and Methods

This is a case descriptive study that was carried out at AL-Imamain AL-Kadhmain medical city, Baghdad, Iraq. Patients in this study were 30 who complained from strabismus. This study last 3 month from February to April 2019.

The patients were clinically examined including Ocular Motility, Corneal light reflex, cover uncover test, visual acuity, ocular exam by silt lamp and dilated fundus exam.

Data collection

The data is collected by interviewing the patients accurately. The collected data is name, age, gender, visual acuity (VA) and Cyclorefraction. We exclude cases of paralytic squint only comitant squint included.

Result

From the total 30 patients that have been counsel the ophthalmology clinic during the mentioned period, we found that the common age group that was affected from 3-7 years old as shown in the next table.

Table: Age groups distribution.

Age group	Number of patients
3-7 years	20
8-11 years	4
12-15 years	5
16 -19 years	1

This pie chart showing us 60% of the patients are male and 40% of the patients are female of total patients' gender, in which male predominate.

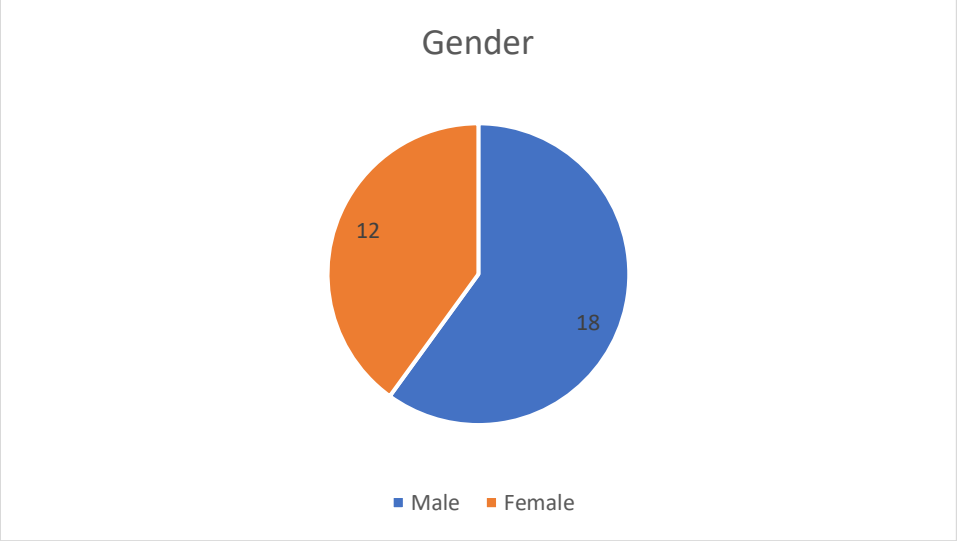

Figure 1: Gender distribution.

In this study total cases are 30, esotropic patients were 18 while exotropic patients were 12 as illustrated in the following pie chart.

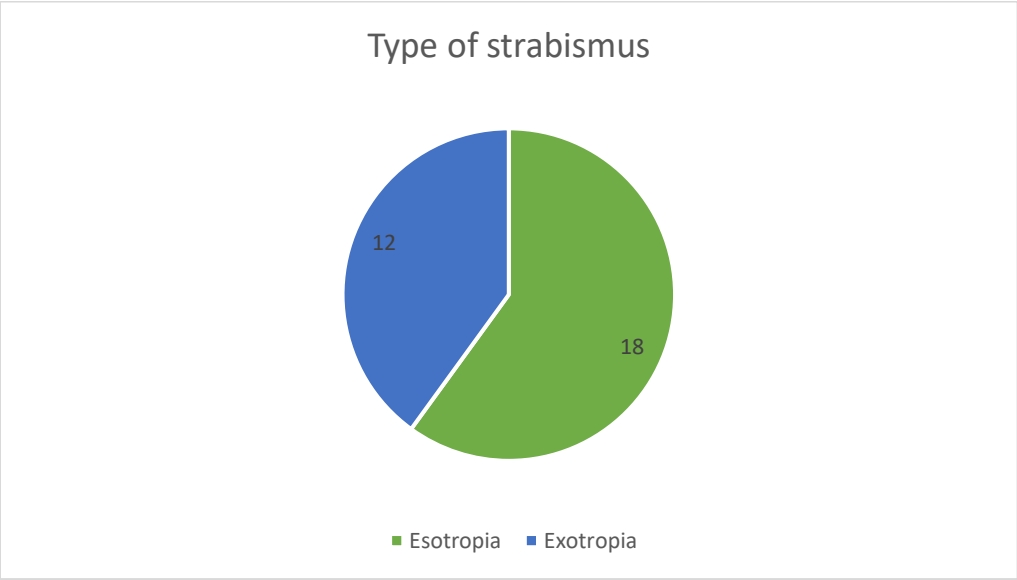

Figure 2: The number of patients in each of the strabismus types.

Majority of esotropic patients found to have Hypermetropia (83%) as shown in pie chart below and 17% have Myopia.

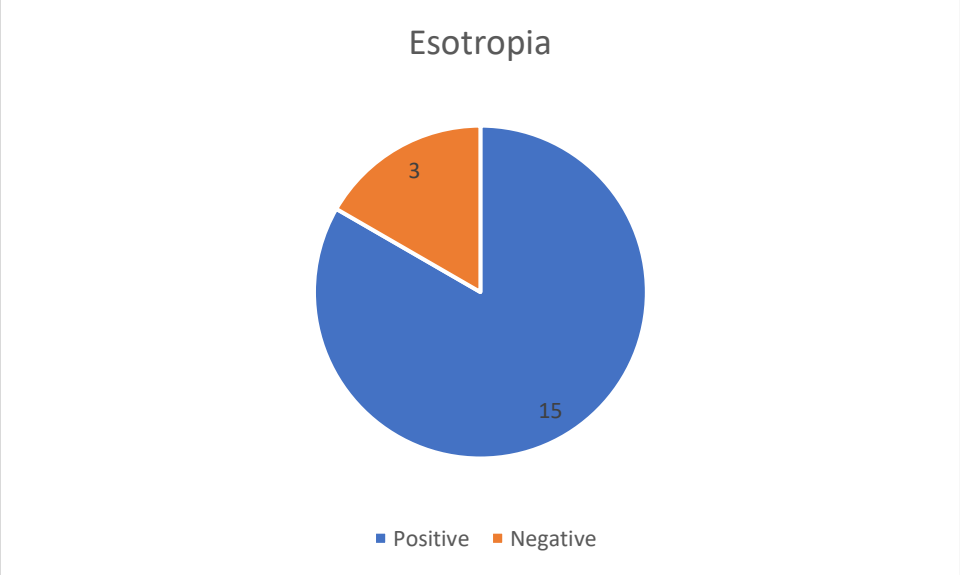

Figure 3: Relation between Esotropia, Myopia and hypermetropia.

Also, exotropic patient in this study found to have hypermetropia in 75% of the patient while myopia found only in 25% of patients.

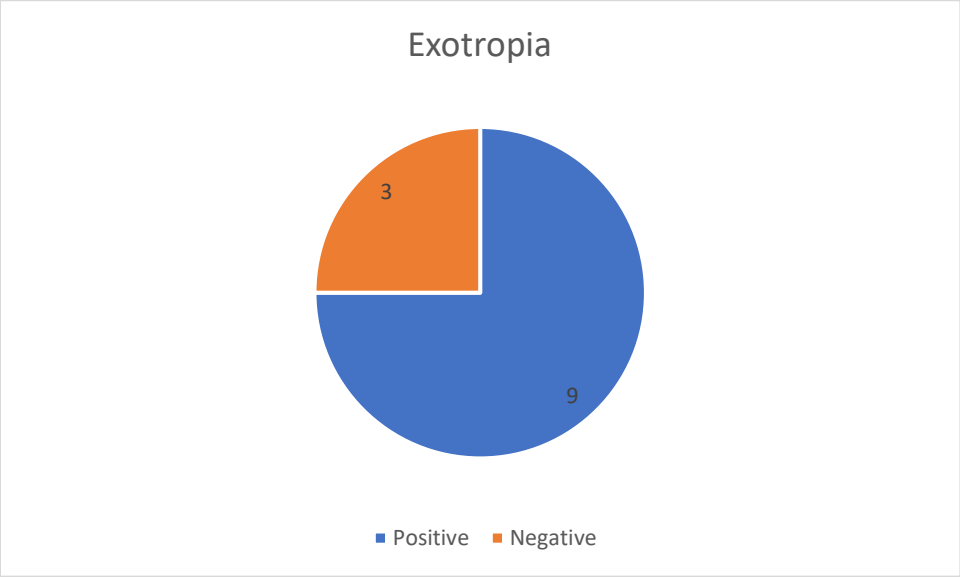

Figure 4: Relation between Exotropia, Myopia and hypermetropia.

Discussion

This thesis will present a better understanding for the association between squint and refractive error. This will be very helpful to guide eye care providers to manage childhood refractive error. The present study aimed to analyze associations between refractive error and different types of strabismus in Al Kadhmain Hospital.

In this study the common age groups that have squint is 3-7 years old. In relation to Dr. Hui Zhu's research where the most common age group was around 5 years old which is considered approximately similar to what we found in this study. [4]

The majority of the patients' gender were males 18 (60%) and the females were 12 (40%) cases. In comparison to Dr. Hui Zhu's research where they had no gender differences. [4]

The most common type of strabismus that the patients had were esotropia 18 (60%) and the exotropia were 12 (40%) cases. In Hui Zhu's research, 270 (86%) patients were exotropic while 45 (14%) esotropic. [4]

The majority of esotropic patients found to have hypermetropia 15 (83%) where is 3 (17%) have myopia. To compare with Dr. Hui Zhu's research where hypermetropic patients dominate over myopic patients. [4]

The majority of exotropic patients found to have hypermetropia 9 (75%) where is 3 (25%) have myopia. To compare with Dr. Hui Zhu's research where myopic patients dominate over hypermetropic patients, which is the opposite to this study. [4]

Conclusion

This study highlights the close associations between refractive error and the prevalence of concomitant esotropia and concomitant exotropia, which should be considered when managing childhood refractive error.

In this study, esotropia was the predominant type of strabismus in patients with refractive error, so it is important to promote public education on the significance of early detection of refractive errors and have periodic screening.

Reference

1. The National Eye Institute. *Facts About Refractive Errors*. 2010. https://nei.nih.gov/health/errors/errors. (accessed 4 February 2019)

2. Kahn, JB. *Types of Refractive Error*. 2019. https://nyulangone.org/conditions/refractive-error/types. (accessed 15 February 2019)

3. Legazpi Eye Center. *Cyclorefraction.* 2013. http://legazpieye.com/cyclorefraction/. (accessed 9 April 2019).

4. Zhu, H et. al. *Association between Childhood Strabismus and Refractive Error in Chinese Preschool Children.* 2015. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4368197/ (accessed 22 march 2019)

5. Root, T. *Chapter 7: Pediatric Ophthalmology.* North Charleston SC: Createspace; 2009. https://timroot.com/pediatrics/. (accessed 27 March 2019)

6. Rutstein, RP. *American Optometric Association. Strabismus: Esotropia and Exotropia.* 2010. https://www.aoa.org/documents/optometrists/CPG-12.pdf. (accessed 4 April 2019)

7. Kanski JJ, Bowling B. *Clinical Ophthalmology*. 7th ed. London: Elsevier Health Sciences; 2015.