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Original Article

Frequency of Horizontal Strabismus Cases at a University Hospital

Frecuencia de los estrabismos horizontales en un hospital universitario de Paraguay

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ABSTRACT

Introduction: Strabismus is an abnormal arrangement of the eyes in which the visual axes are not directed at the same object at the same time. Depending on the direction of the deviation, they are classified as horizontal, vertical and torsional. Horizontal strabismus can be subclassified into esotropias and exotropias. **Objective:** To determine the frequency of the different types of strabismus that attend a university hospital in Paraguay. **Materials and methods:** Observational, descriptive, cross-sectional, retrospective design. Non-probabilistic sampling of consecutive cases. The electronic records of patients of all ages diagnosed with strabismus who attended the Ophthalmology Service of the Hospital de Clínicas in the city of San Lorenzo, Paraguay, from January 2022 to December 2023 were studied. The variables analyzed were: age, sex and the different types of esotropias and exotropias. **Results:** 393 horizontal strabismus were found. The mean age was 12.13 ± 12.50 years, with an age range of 3 months to 83 years. 205 (52.2%) patients were female. 206 (52.4%) cases were esotropias, of which 101 (49%) cases were congenital esotropias. 187 cases (47.6%) were exotropias, of which 117 (62.6%) cases were intermittent exotropias. **Conclusion:** Esotropias were the most frequent type of ocular misalignment, among which the most frequent subtype was congenital esotropia. Intermittent exotropia was the most frequent subtype of exotropia.

Keywords: strabismus, esotropia, exotropia.

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RESUMEN

Introducción: El estrabismo es la disposición anómala de los ojos por la cual los ejes visuales no se dirigen a la vez al mismo objeto. Según la dirección de la desviación, se clasifican en horizontales, verticales y torsionales. Los estrabismos horizontales pueden subclasificarse en esotropias y exotropias. **Objetivo:** Determinar la frecuencia de los diferentes tipos de estrabismos que acuden a un hospital universitario de Paraguay. **Materiales y métodos:** Diseño observacional, descriptivo de corte transversal, retrospectivo. Muestreo no probabilístico de casos consecutivos. Se estudiaron las fichas electrónicas de los pacientes de todas las edades con diagnóstico de estrabismo que acudieron al Servicio de Oftalmología del Hospital de Clínicas en la ciudad de San Lorenzo, Paraguay, de enero de 2022 a diciembre de 2023. Las variables analizadas fueron: edad, sexo y los diferentes tipos de esotropias y exotropias. **Resultados:** Se encontraron 393 estrabismos horizontales. La media de edad fue de 12,13 ± 12,50 años, con un rango de edad de 3 meses a 83 años. Unos 205 (52,2%) pacientes fueron de sexo femenino. Unos 206 (52,4%) casos fueron esotropias, de las cuales 101 (49%) casos fueron esotropias congénitas. Unos 187 casos (47,6%) fueron exotropias, de las cuales 117 (62,6%) casos fueron exotropias intermitentes. **Conclusión:** Los estrabismos horizontales más frecuentes fueron las esotropias, entre las cuales el tipo más frecuente fue la esotropia congénita. La exotropia intermitente fue el tipo de exotropia más frecuente.

Palabras clave: estrabismo, esotropia, exotropia.

Introduction

Strabismus is an abnormal alignment of the eyes in which the visual axes are not directed at the same object simultaneously [1]. Strabismus can produce diplopia in mature individuals, as well as psychosocial and occupational disturbances, while in visually immature individuals, adaptive mechanisms may occur that ultimately lead to irreversible visual impairment, generally unilateral, called amblyopia [2]. Amblyopia is the most frequent cause of low vision in children [3] as well as in adults up to middle age [4].

According to the direction of deviation, strabismus can be classified as horizontal, which in turn may be convergent ("esotropia") or divergent ("exotropia"); vertical, which may be "hypertropia" when the deviated eye is directed upward or "hypotropia" when directed downward; or torsional, which may be "incyclotropia" when the deviated eye intorts or "excyclotropia" when extorts [5].

There are several classifications of horizontal strabismus; in this study, we will use that of Prieto-Díaz and Souza-Días [6].

Among esotropias, several types will be considered. Congenital or infantile esotropia is that which presents before 6 months of age, generally in otherwise healthy children [7]. Accommodative esotropias are those that manifest when accommodation is used [5]. Acquired comitant or non-accommodative esotropia is a type of esotropia that appears after 6 months of age but before completion of visual maturation [6]. Acute acquired comitant esotropia is an acute-onset, comitant, non-accommodative esotropia that appears in adults or visually mature children aged 5 years or older who are presumed to have had previously aligned eyes, and it is a diagnosis of exclusion reached after ruling out neurological pathology [8]. Microesotropia is a small-angle esotropia (less than 8 prism diopters), monocular, with a strong tendency to develop mild amblyopia in the deviated eye and usually showing some degree of binocular vision of low functional hierarchy [9]. Cyclic esotropia is a rare type of esotropia, with variable age of onset but more frequent in preschool children; it is characterized by periods of deviation with

suppression, followed by periods of orthotropia with normal sensory and motor examination, without associated neurological alteration [6]. Heavy Eye Syndrome refers to cases in which myopia has a direct pathophysiological role; the most frequent finding is high myopia with increased axial length, with the development of a staphyloma between the superior and lateral rectus muscles, producing esotropia and hypotropia with limitation of abduction and elevation, a condition called heavy eye syndrome [6].

On the other hand, several types of exotropias will also be considered. Intermittent exotropia is a type of exotropia in which, at times, the eyes are aligned with normal retinal correspondence and stereopsis and, at other times, in divergence with suppression [6]. Infantile exotropia is that which begins before 6 months of age; it is usually associated with neurological pathology and craniofacial disorders, and generally presents with a large angle of deviation, profound binocular dissociation, and high rates of amblyopia [6]. Constant exotropia begins after 6 months of age and is common in patients with a long-standing history of intermittent exotropia that has decompensated [5]. Microexotropia is a rare entity, characterized by a small-angle exotropia (less than 8 prism diopters), monocular, with binocular cooperation of lower functional hierarchy compared to microesotropia [6].

OBJECTIVE

To determine the frequency of the different types of strabismus presenting at a university hospital in Paraguay.

Materials and Methods

The design of this study was observational, descriptive, cross-sectional, and retrospective. Sampling was non-probabilistic with consecutive cases. Electronic records of patients of all ages with a diagnosis of strabismus who attended the Ophthalmology Service of Hospital de Clínicas in the city of San Lorenzo, Paraguay, from January 2022 to December 2023 were reviewed.

The variables considered were: age (continuous quantitative variable), in years; sex (dichotomous variable: male/female); esotropia (nominal qualitative variable: congenital esotropia, accommodative esotropia, acquired comitant esotropia, acute acquired comitant esotropia, sensory esotropia, residual esotropia, microesotropia); exotropia (nominal qualitative variable: intermittent exotropia, sensory exotropia, constant exotropia, infantile exotropia, consecutive exotropia, residual exotropia, microexotropia).

Records with incomplete data and those of patients who discontinued follow-up were excluded. Ethical principles of research were considered, and confidentiality of personal data was maintained.

Results

A total of 393 cases of horizontal strabismus were identified. The mean age was 12.13 ± 12.50 years, with a range from 3 months to 83 years. A total of 205 (52.2%) patients were female; the remainder (103, i.e., 47.8%) were male. The most frequent strabismus types were esotropia, with 206 (52.4%) patients; the remainder (187 patients, i.e., 47.6%) were exotropia.

Among esotropias, the most frequent type was congenital esotropia, with 101 (49%) patients, as detailed in **Figure 1**.

Among exotropias, the most frequent type was intermittent exotropia, with 117 (62.6%) patients, as detailed in **Figure 2**.

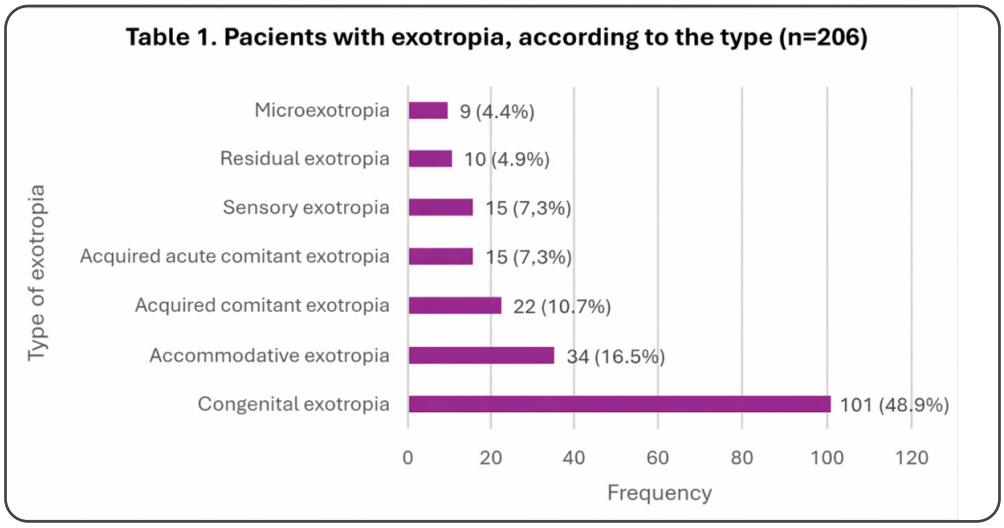

Figure 1. Pacients with exotropia, according to the type (n=206).

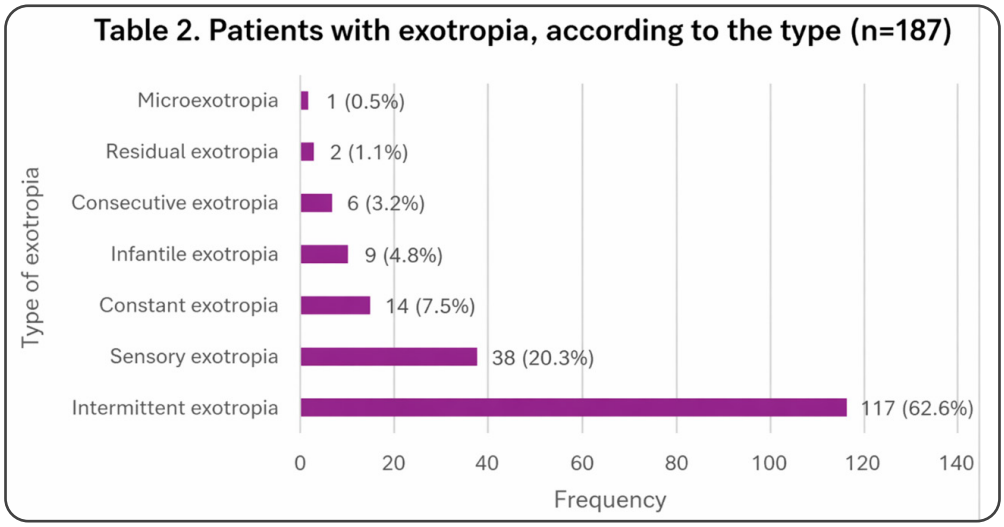

Figure 2. Patients with exotropia, according to the type (n=187).

Discussion

The most frequent horizontal strabismus types in this study were esotropias (52.4%) compared to exotropias (47.6%), reflecting the Western pattern, although without such a large margin of difference compared to other studies in the Western world. Prieto-Díaz and Souza-Días refer to a study conducted in South America by Ciancia and Melek, unpublished, in which esotropias accounted for 90% of horizontal strabismus [6]. In a study conducted at Hospital do Servidor Público Estadual de São Paulo, Brazil [10], a predominance of esotropias was also found (44.52%), similar to the percentage observed in our study. In the study by Adán-Hurtado and Arroyo-Yllanes [11], 46.3% esotropias and 27.64% exotropias were reported, while Mohney [12] found 60.1% esotropias and 32% exotropias. In Asian populations, exotropias are more frequent than esotropias, even doubling their frequency [13].

Among esotropias, the most frequent type was congenital esotropia, representing

49% of cases. This is consistent with the study by Adán-Hurtado and Arroyo-Yllanes (11), in which they accounted for 28.46% of esotropias. This contrasts with Mohney's study on esotropias (14), in which congenital esotropia accounted for only 5.4%, while accommodative esotropias were the most frequent, representing 52% of esotropias. Previous classic studies conducted in the United States reported congenital esotropia in approximately one quarter to one third of esotropias (14,15). This difference may be due, at least in part, to different inclusion and exclusion criteria. Prieto-Díaz and Souza-Días (6) reported that congenital esotropias represented 50% of their strabismus patients; in our study, congenital esotropias represent 18.2% of total strabismus cases and 23.3% of non-paralytic strabismus. Regardless of the percentage considered, these values are far below those reported by them. A study conducted in the United Kingdom reported a 55% decrease in the incidence of congenital esotropia between 1971 and 1991 (16). On the other hand, a population-based study in Minnesota, United States, demonstrated a constant incidence of this condition between 1965 and 1994 (17). Steven Archer has recently reported observing fewer cases of congenital esotropia in his clinical practice over time (18), which may also partly explain the difference between current and older statistics.

In our study, no cases of cyclic esotropia or heavy eye syndrome were found, which can be explained by the rarity of these conditions. Cyclic esotropia has a frequency of approximately 0.02% of strabismus cases (6), while heavy eye syndrome occurs in approximately 2.65% of patients with myopia greater than -6 diopters (19).

In the group of exotropias in our study, the most frequent type was intermittent exotropia, representing 62.6% of cases. This is consistent with a study conducted in Argentina by Melek (20), in which intermittent exotropias accounted for 85% of exotropias; it also agrees with the study conducted by Souza-Días in Brazil, in which intermittent exotropias accounted for 53%. Likewise, it is consistent with Mohney's study on exotropias (21), in which they accounted for 47.7%, and with the study by Adán-Hurtado and Arroyo-Yllanes (11), in which they accounted for 35.3%.

This study has limitations due to its observational, descriptive, and retrospective design, and there is also a risk of referral bias, as it is a reference hospital, making it impossible to calculate the exact prevalence of the described conditions. Nevertheless, we believe it is relevant for obtaining an understanding of the epidemiology of strabismus in the Paraguayan population, as there are currently no scientific articles on this topic available in virtual libraries. We suggest conducting further studies, for example with a prospective design, to gather more epidemiological data on this condition.

Conclusion

The most frequent horizontal strabismus types were esotropias, among which congenital esotropia was the most common; the remainder were exotropias, among which intermittent exotropia was the most frequent.

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