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Research Article

Frequency and Etiology of Paralytic Strabismus

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Abstract

Aim: To describe demographics and etiologic factors of patients with paralytic strabismus.

Materials and Methods: A retrospective review of strabismus patient charts was performed and paralytic strabismus was isolated and evaluated for age, sex, etiology, type of strabismus and lateralization.

Results: Out of 800 charts of strabismus patients, 38 (4.75%) patients were found to have paralytic strabismus. Mean age of patients was 25.6 (3-63) years. Fifteen were female and 23 were male. The most common affected nerve was the fourth (52.6%). Sixth cranial nerve was affected in 26.3% and third nerve in 5.3% of patients. Four patients (10.5%) had vertical or horizontal gaze palsy and two (5.3%) had double elevator palsy. Regarding the etiology of strabismus, most were congenital (34.2%) and others developed secondary to trauma (26.3%), intracranial lesion (18.35%), infection (7.9%) and some were undetermined (13.15%).

Conclusion: The most commonly affected nerve in our study is the fourth and the most frequent cause is congenital. Sixth and third CN palsies developed mostly after trauma. In gaze palsies intracranial pathology should be considered.

Keywords: Cranial nerve; Paralytic strabismus, Etiology

Introduction

Paralytic strabismus is an ocular pathology where one or more of the Cranial Nerves (CN) innervating the extraocular muscles are affected. In a study of Stidwill D. the prevalence of paralytic strabismus among 3075 cases with binocular vision anomaly was found to be 10% [1]. Martinez-Thompson et al evaluated the incidence and types of adult onset strabismus in a population-based cohort and found that paralytic strabismus is the most common subtype of new-onset adult strabismus [2]. Etiology varies in different types of paralytic strabismus. The most commonly affected CN varies between previous reports on paralytic strabismus. Fourth CN is commonly involved in studies on pediatric population and sixth nerve is more frequently affected in adults. In a review of only acquired pediatric cranial nerve palsies, Kodsi and Younge noted that sixth nerve palsies were the most common [3-6]. In pediatric population paralysis is mostly congenital whereas in elderly, trauma or underlying pathology should be suspected [4,6,7].

Data on the incidence and etiology of different types of paralytic strabismus may be helpful for ophthalmologists or other physicians in guiding diagnosis and evaluation, and may be useful for proper intervention. The aim of this study is to describe demographics and etiologic factors of patients with paralytic strabismus.

Materials and Methods

A retrospective chart review of all patients with strabismus who presented to Samsun Ondokuz Mayis University Ophthalmology clinics from March 2012 to August 2014 was performed. From approximately 800 cases, patients with paralytic strabismus of all ages were identified. Entire medical record of these patients was reviewed for data collection. Age, sex, type of strabismus, etiology and treatment strategies were analyzed. Fourth, third, sixth cranial nerve palsy, Double Elevator Palsy (DEP) and gaze palsies were included in this study. The diagnosis of nerve palsy was mainly based on the presenting symptoms and signs. Neurology consultation and imaging was performed in selected cases. Etiology was classified as congenital, traumatic, idiopathic (undetermined cause), postinfectious, or secondary to intracranial lesion or dural sinus thrombosis. The study followed the tenets of the Declaration of Helsinki.

Results

A total of 38 patients with paralytic strabismus were identified. Age at presentation ranged from 3 to 63 years, with a mean age of 25.6 years. There were 15 (39.5%) female and 23 (60.5%) male patients. The most commonly affected nerve was the fourth (20 patients, 52.6%). Sixth cranial nerve was affected in 10 (26.3%) and third nerve in 2 (5.3%) of patients. Four patients (10.5%) had vertical or horizontal gaze palsy and two (5.3%) had double elevator palsy. Age, sex and affected eye of patients according to the type of palsy are shown in Table 1. Regarding the etiology of strabismus, most were congenital (34.2%) and others were associated with trauma (26.3%), intracranial lesion (18.35%), infection (7.9%), or were idiopathic (13.15%). Fourth nerve palsy was congenital in 11, due to trauma in 4, postinfectious in 1 and idiopathic in 4. All patients had strabismus surgery. Sixth nerve palsy developed secondary to trauma in 4, intracranial tumor in 1, infection in 2 and dural sinus thrombosis in 2 patients, while etiology was not determined in 1 case. Only 3 patients had strabismus surgery and four were managed with botulinum toxin injection. Patients with dural sinus thrombosis were treated with anticoagulation therapy. Both cases with third nerve palsy were traumatic and had botulinum toxin injection to alleviate the symptoms. One patient with DEP was treated surgically and the other patient had no intervention. Three

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Table 1: Characteristics of different types of strabismus.

Type of strabismus	Mean age (years)	Sex (M-F)	Lateralization (R-L)
4th cranial nerve palsy	21.6	11-9	12-8
6th cranial nerve palsy	33.1	7-3	6-4
3rd cranial nerve palsy	31.5	2-0	1 bilateral, 1 left
Horizontal-vertical gaze palsy	33.2	2-2	1 vertical, 2 left INO 1 vertical+right gaze palsy
Double elevator deficiency	7.5	1-1	2-0

M-F: Male-Female; R-L: Right-Left; INO: Internuclear ophthalmoplegia

patients with gaze palsies were associated with intracranial tumors in the brainstem region. One patient had internuclear ophthalmoplegia secondary to multiple thrombi in the pons region after the cardiac angiography which resolved with anticoagulation treatment.

Discussion

This study provides data on cranial nerve palsies of all ages admitted to the hospital in a time interval of two years. Most frequently affected nerve was the fourth and it was mostly congenital. It was followed by the sixth, gaze palsy, third and DEP. Trauma was the main cause for sixth and third nerve palsy and intracranial lesion was the main reason in gaze palsies. In a population based study on the incidence and the cause of CN palsies performed by Holmes et al, fourth CN was mostly affected. Olusanya et al reported a 15 year review on paralytic strabismus in Cape Town and found a 52% of fourth CN involvement. In both studies the most common cause was congenital, followed by trauma [3,4]. These findings were similar to our results, however they included pediatric patients with an age of less than 18 and 14 years respectively. The findings of Pedro-Egbe et al, which included CN palsies of all ages, differ from our results as they found the fourth nerve palsy to be the least frequently affected [8].

Our methodology differed from some of the previous studies in other respects. Unlike previously described studies, we included the patients with DEP and gaze palsies and the age was not restricted, primarily because we intended to provide data on the whole etiologic spectrum of different types of palsies.

Trauma was the main cause in sixth and third CN palsies in our study. Patel et al examined 137 cases with sixth nerve palsy. Etiology was undetermined in 26% of cases and 16% had trauma or cerebrovascular accident. They had a high percentage of systemic disease such as diabetes mellitus (DM) and hypertension (HT) [7]. In a study of Pedro-Egbe et al on all types of CN palsies, DM and HT was also frequent (38%) [8]. The difference from our study may be attributed to lower number of patients in our study as we only have 10 cases with sixth and 2 cases with third CN palsies.

We had four cases with gaze palsies; two of whom had internuclear ophthalmoplegia, one had right gaze palsy and one had vertical gaze palsy. The etiology was posterior fossa tumor in two, tectal glioma in one and multiple pontine emboli after the cardiac angiography in one patient. Most of the time, it is possible to localize the lesion according to the ophthalmological examination findings. For example, isolated dysfunction of vertical eye movements is due to a midbrain lesion affecting the rostral interstitial nucleus of the medial longitudinal fascicle. Isolated dysfunction of horizontal saccades is due to a pontine lesion affecting the paramedian pontine reticular formation [9].

We included the cases with DEP, both were congenital as expected. One of them has undergone strabismus surgery, including inferior rectus recession and transposition of medial and lateral rectus muscles superiorly, but had only mild improvement. Xiao et al proposed that an inferior rectus recession and superior oblique tenectomy is effective in these patients because superior rectus muscle and inferior oblique muscle insufficiency are the primary factors in the etiology of congenital ocular double elevator palsy [10].

Conclusion

In conclusion, the most common CN palsy in strabismus patients followed in Ondokuz Mayis University Hospital Eye Clinic was the fourth CN, followed by the sixth. Most cases with fourth nerve palsy were congenital, while cases with sixth and third nerve palsies developed after trauma. A further study involving higher number of patients would provide a more comprehensive summary of the frequency and the etiology of CN palsies.

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