Published in final edited form as:

Orbit. 2013 August ; 32(4): 231–234. doi:10.3109/01676830.2013.788673.

Relative Incidence of Blepharoptosis Subtypes in an Oculoplastics Practice at a Tertiary Care Center

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Abstract

Purpose—In patients referred with blepharoptosis, the possibility of an underlying systemic cause for their ptosis can warrant a more detailed evaluation. The purpose of this study is to determine both the incidence and demographic characteristics associated with different types of ptosis in patients referred to the oculoplastics division at a tertiary care center.

Methods—A retrospective chart review was performed on all patients referred to the oculoplastics division between 2007 and 2010. Final etiology for each patient's ptosis was determined based on history, standard eyelid measurements, and ancillary testing. Based on etiology, ptosis was categorized as aponeurotic, neurogenic, myogenic, traumatic, or congenital. Demographics, including median age and sex were analyzed for patients in each category of ptosis.

Results—Of the 251 patients, aponeurotic ptosis was the most common type of ptosis (60.2%), followed by traumatic (11.2%), congenital (10.4%), mechanical (8.8%), neurogenic (5.6%), and myogenic (4.0%). Of the neurogenic group, 35.7% of patients had cranial nerve 3 (CN 3) palsy, 28.6% had myasthenia gravis, 14.3% had aberrant regeneration, and 7.1% had Horner's syndrome. Thirty percent of the myogenic group had chronic progressive external ophthalmoplegia (CPEO). The congenital group had the youngest median age (10.5 years), yet the aponeurotic group had the oldest (62 years).

Conclusions—A significant proportion of patients referred with ptosis had more serious conditions such as neurogenic or myogenic ptosis. Thus, clinicians should maintain a high degree of suspicion and thoroughly evaluate all patients with ptosis in order to properly assess for underlying systemic associations.

Keywords

Cranial nerve 3 palsy; Horner's syndrome; myasthenia gravis; myogenic ptosis; neurogenic ptosis

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DECLARATION OF INTEREST The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

INTRODUCTION

Blepharoptosis (ptosis) is a common complaint in patients referred to any oculoplastics practice. The vast majority of these cases result from largely benign etiologies, such as age-related stretching of the levator aponeurosis. However, a number of life-threatening conditions can also present with ptosis as an isolated or initial patient complaint. In particular, neurogenic ptosis from myasthenia gravis or an intracranial aneurysm causing a third cranial nerve palsy may require urgent referral to other medical services for management of associated systemic comorbidities.

Although ptosis can often be diagnosed clinically based on standard eyelid measurements, a more thorough exam is warranted to rule out more concerning causes of ptosis and provide for appropriate therapy. In general, different types of ptosis may be categorized based on their etiologies, with the major types of ptosis being aponeurotic, myogenic, congenital, traumatic, neurogenic, and mechanical.^{1,2} Determination of the etiology often requires a more thorough review of the patient's history, external appearance, and measurements taken during the clinical exam.

Classically, aponeurotic ptosis presents with a reduced margin to reflex distance 1 (MRD₁), a high upper eyelid crease, a near normal levator function (LF), and decreased palpebral fissure in downgaze ($\downarrow$ PF). In contrast, myogenic and congenital ptosis present with a weak or absent upper eyelid crease, poor LF, and eyelid lag on downgaze. Traumatic ptosis requires a reliable history for accurate diagnosis, while neurogenic ptosis can be diagnosed by associated neurologic deficits such as other cranial nerve palsies or an abnormal pupil. Careful examination of the lids can aid in determining any mechanical cause of ptosis.

In dedicated oculoplastics subspecialty practices that manage higher volumes of ptosis patients, physicians are more likely to encounter a significant number of cases where the patient's ptosis heralds a more concerning systemic disease. An accurate estimate of the overall incidence of these more concerning cases in any given oculoplastics subspecialty practice is useful information for the oculoplastic surgeon who must maintain an appropriate degree of clinical suspicion in the evaluation and management of all ptotic patients. The purpose of this study is to determine both the incidence and demographic characteristics associated with different types of ptosis in patients referred for oculoplastics subspecialty evaluation at a tertiary referral center. To our knowledge, there has been no similar study to date in the United States.

MATERIALS AND METHODS

A retrospective chart review was performed of all patients referred for ptosis to the oculoplastics division at the University of Illinois Eye and Ear Infirmary between 2007 and 2010. Patients without a final diagnosis and those not directly evaluated by the oculoplastics attending were excluded. The etiology for each patient's ptosis was determined based on history and exam; measurements of MRD₁, LF, $\downarrow$ PF; and ancillary testing. Specifically, single fiber electromyography and acetylcholine receptor antibody testing was used to help

in diagnosing myasthenia gravis. Neuroimaging was used in CN 3 palsy. Horner's syndrome was tested for pharmacologically and investigated with imaging.

In all patients, the determined etiology of ptosis was categorized into six major types of ptosis: aponeurotic, myogenic, congenital, traumatic, neurogenic, or mechanical. The relative proportions of the different types of ptosis were then calculated. In addition, the median age and gender ratio were analyzed. Analysis of possible gender predilection within each group was then performed using a Chi-squared test. Although myasthenia gravis is an autoimmune disorder that targets the neuromuscular junction and has been categorized as either neurogenic or myogenic ptosis in the literature, all patients with myasthenia gravis in our study were considered to have neurogenic ptosis.

RESULTS

In total, 275 patients met inclusion criteria for the study. Twenty four patients were excluded due to lack of definitive diagnosis or documented exam by the oculoplastics attending. Thus, in total, data was analyzed from 251 patients in this study.

Aponeurotic ptosis was the most common type of ptosis (60.2%, 151/251), followed by traumatic (11.2%, 28/251), congenital (10.4%, 26/251), mechanical (8.8%, 22/251), neurogenic (5.6%, 14/251), and myogenic (4.0%, 10/251). Of the neurogenic group, 35.7% (5/14) of patients had CN 3 palsy, 28.6% (4/14) had myasthenia gravis, 14.3% (2/12) had aberrant regeneration, and 7.1% (1/14) had Horner's syndrome (Figure 1). Patients with chronic progressive external ophthalmoplegia (CPEO) comprised 30% (3/10) of the myogenic group. Other etiologies in the myogenic group included: post-surgical and medication induced (such as steroids and tenofovir). The median age of presentation for patients with each type of ptosis was: congenital (10.5 years; range, 0.58 to 60), traumatic (36 years; range, 4 to 71), neurogenic (47 years; range, 14 to 76), myogenic (47.5 years; range, 31 to 81), mechanical (62 years; range, 15 to 78), and aponeurotic (62 years; range, 8 to 90). Ptosis secondary to trauma had a statistically higher percentage of males than the overall ptosis group (64.3% versus 44.6%, $p = 0.04$ by Chi-squared test). The other categories did not have a statistical difference in the gender distribution when compared to the aggregate study sample (Table 1).

DISCUSSION

Aponeurotic ptosis was the most common type of ptosis that presented to our referral-based, tertiary care oculoplastics division, making up more than 60% of the patients. Aponeurotic ptosis is secondary to stretching or dehiscence of the levator aponeurosis typically acquired with repetitive traction or involution of the tissue. Thus as expected, patients in this category had highest median age compared to all other groups (62 years; range 8 to 90).

Previous studies have shown differing incidences in the types of ptosis. A study of the epidemiology of ptosis at a teaching hospital in Nepal classified ptosis as either congenital or acquired and showed that congenital ptosis was the most common cause of ptosis. In their study 62.4% of their ptosis cases were congenital and 37.6% of cases were acquired, of which only 10.7% were aponeurotic.³ Another study from Nigeria looked at 25 cases of

ptosis over a 5 year period and found that 56% of these cases were congenital.⁴ Contrary to our findings, these studies found a higher incidence of congenital ptosis compared to acquired ptosis. This may be due to the fact that overall the Nepalese and Nigerian populations are younger when compared to the U.S. population.

According to the World Health Organization, the life expectancy for males and females in Nepal is 65 and 69, respectively,⁵ and in Nigeria is 53 and 54 years old, respectively.⁶ In contrast, in the United States the life expectancy for males and females is 76 and 81, respectively.⁷ Because acquired ptosis is most commonly due to aging, it stands to reason that there would be a greater burden of acquired ptosis in the older U.S. population. Beyond life expectancy, cultural and socioeconomic factors and differences in referral patterns may also contribute to the disparity between our studies. There are no similar studies within the United States with which to compare our results.

Traumatic ptosis was the second most common type of ptosis diagnosed in our retrospective review. In a tertiary care center with an associated high-volume emergency room, traumatic ptosis is likely to compose a significant portion of referred cases. This group of patients had the second lowest median age after the congenital ptosis group and a statistically significant higher prevalence of males, reflecting the typical demographic involved in ocular trauma.⁸

Congenital ptosis represented 10.4% of the patients with ptosis in our study. These patients further represented the youngest group with a median age of 10.5 years old. Previous studies have reported mean ages ranging from 4.13 to 16 years old.^{9,10} The slightly older age of our congenital ptosis patients is likely due to fact that a number of congenital ptosis patients in the study period were managed primarily by our pediatric ophthalmology department. In contrast, complicated cases, cases with delay in presentation, or cases requiring re-operation were more likely to present to the oculoplastics clinic. Due to the potential for delayed presentation of congenital ptosis it is important to consider the diagnosis even in older patients.

The major causes of neurogenic ptosis include CN 3 palsy, myasthenia gravis, aberrant regeneration, and Horner's syndrome. Of the neurogenic group, 35.7% of patients had CN 3 palsy, 28.6% had myasthenia gravis, 14.3% had aberrant regeneration, and 7.1% had Horner's syndrome. This particular group of patients is important to diagnose correctly because of their associated neurologic problems. Specifically, CN3 palsy may necessitate imaging to rule out a compressive etiology. Those with myasthenia gravis could have respiratory compromise or a concurrent thymoma.¹¹

A history of intermittent diplopia and worsening symptoms throughout the day suggesting fatigability should increase the suspicion for myasthenia gravis. On exam, a positive rest, ice, or edrophonium test can further assist in diagnosis. Acetylcholine receptor antibody testing is positive in 87–98% of patients with generalized myasthenia gravis and 39–71% with ocular myasthenia.¹² Occasionally, a single fiber electromyography or a trial of pyridostigmine may be warranted to help diagnose myasthenia gravis if other tests are inconclusive. If Horner's syndrome is suspected, pharmacologic testing with eye drops

(hydroxyamphetamine, cocaine, and iopidine) and imaging may be an important part of the detecting the underlying cause.

Although myogenic ptosis was the smallest group, it is important to recognize CPEO, which composed 30% of the myogenic group in this study. A family history showing a maternal inheritance pattern, imaging studies to rule out other possible causes of ophthalmoplegia, and a muscle biopsy can aid in diagnosing this mitochondrial disease. Because CPEO may be associated with Kearns-Sayre syndrome, these patients often warrant additional work-up for cardiac conduction defects and pigmentary retinopathy. Another cause of myogenic ptosis was medication induced, specifically steroid and tenofovir-induced. These have both been described in the literature^{13,14} and stresses the importance of a reviewing a patient's medications.

Blepharoptosis is a common reason for patient referral to oculoplastics practices at tertiary care referral centers. There is no similar patient population study about the relative incidence of ptosis subtypes in the United States and appropriate management of ptosis is greatly dependent on accurate determination of the etiology of the ptosis. There are limits to this study, namely the limited urban geographic location of the patient population, referral based practices, and the limited number of pediatric patients. In addition, the 24 patients that were excluded from the final analysis could potentially represent a selection bias.

Although, aponeurotic ptosis was the most common etiology for ptosis in our practice within the study period, more serious cases of ptosis from neurogenic and myogenic causes were present in a significant proportion of our patients. Thus, clinicians should maintain a high degree of suspicion and thoroughly evaluate all patients with ptosis in order to properly assess and treat underlying systemic associations.

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FIGURE 1.

TABLE 1

Gender predilection in blepharoptosis subtypes by etiology.

	Aponeurotic	Neurogenic	Myogenic	Trauma	Congenital	Mechanical	Total
Female	87 (57.6%)	10 (71.4%)	6 (60%)	10 (35.7%)	13 (50%)	13 (59.1%)	139 (55.4%)
Male	64 (42.4%)	4 (28.6%)	4 (40%)	18 (64.3%)	13 (50%)	9 (40.9%)	112 (44.6%)
<i>p</i> Value	0.64	0.23	0.77	0.04	0.58	0.73	