EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 11
Issue: 8
56-58
Year: 2024

PTOSIS: A REVIEW ARTICLE

Dr. Shayri Pillai*

Ophthalmologist, Oculoplasty Oncologist in Ministry of Health, Liberia. Fellow at Lenox Hill Hospital, New York.

***Corresponding Author: Dr. Shayri Pillai**

Ophthalmologist, Oculoplasty Oncologist in Ministry of Health, Liberia. Fellow at Lenox Hill Hospital, New York.

Article Received on 11/06/2024 **Article Revised on 02/07/2024** **Article Accepted on 23/07/2024**

INTRODUCTION

Ptosis is inferior displacement of upper eyelid when the eye is in the primary position. Ptosis is also known as blepharoptosis. Apart from the cosmetic concern, patients with ptosis suffer from problems in the quality of vision.

ETIOLOGY

Ptosis is classified into congenital or acquired based on the age of presentation; also further categorized into five types based on etiology:

Neurogenic: It results from defective innervation of the levator muscle of upper eyelid. Third nerve palsy and Horner's syndrome are the important causes of neurogenic ptosis. Third nerve palsy can result from vascular/inflammatory/neurotoxic or compressive etiology.

It presents with ptosis, extraocular muscle restriction sparing the lateral rectus and superior oblique, down and out eyeball and with or without pupillary involvement (Mydriasis).

Myogenic: Dysfuction of levator muscle or defect at its neuromuscular junction. Most commonly seen as congenital ptosis where there is LPS dysgenesis.

Other examples includes myogenic ptosis. myasthenia gravis, ocular myopathy, blepharophimosis syndrome, etc.

Mechanical: The mechanical ptosis is caused due to excessive skin overhanging the eyelid and mass or scar that weigh down the upper lid. The correction of ptosis in this regard is by correcting the underlying cause first, and the residual ptosis can be corrected by levator advancement in patients with good LPS function.

Aponeurotic: Also known as Involutional ptosis, where levator aponeurosis is defective as stretched/attenuated dehisced/detached from its tarsal attachments. It can be seen due to aging, trauma or post operative complication.

Traumatic: Any kind of direct or indirect trauma to the eyelid leading to levator transection, cicatrization, eyelid laceration or orbital rooftop fracture with ischemia can cause ptosis.

PATHOPHYSIOLOGY

Levator palpebrae superioris (LPS) and Muller's muscle are two muscles of upper eyelid responsible for its elevation.

LPS is the main elevator which is supplied by the oculomotor nerve. The levator palpebrae superioris muscle origin is the lesser wing of the sphenoid bone, it travels anteriorly above the superior rectus muscle, and attaches in multiple insertions: anteriorly into the upper eyelid skin, inferiorly on the anterior surface of the upper tarsal plate and to the superior conjunctival fornix.

Muller's muscle is a smooth muscle also attached to the superior tarsal plate with sympathetic innervation, which is defective in ptosis of Horner syndrome.Loss of innervation of LPS and Muller's muscle causes neurogenic ptosis.

Levator muscle dystrophy causes simple congenital ptosis. On the other hand, involutional changes in the eyelid are the most common pathogenesis in adult ptosis.

HISTORY

A proper history is always an important tool for diagnosis. Apart from the usual ophthalmic and medical history, the points that should be emphasized in a case of ptosis are:

- Onset and duration of ptosis
- Variability – Diurnal variation and progression
- Severity of ptosis – Whether the activities of daily living are affected
- Involvement of one eye after the other/both eyes simultaneously
- Precipitating factors – history of trauma, eye surgeries, previous eye diseases such as dry

eye/thyroid eye disease, pregnancy, delivery, and medical conditions
- Associated conditions – Jaw winking, diplopia, dysphagia, tiredness
- Family history – Congenital or hereditary ptosis, ocular myopathies, blepharophimosis, etc.

EVALUATION

Assessment by the following measurements

Levator muscle function

Assessment of the functional status of the levator muscle is by placing the thumb firmly against the patient's eyebrow, with eyes in downward gaze.

Then patient looks upward, and the amount of excursion is measured with a scale which can be graded as:

Ptosis (mm)	Levator muscle function (mm)	Levator muscle resection (mm)
1-2	Good (8+)	10-13
3	Good (8+)	14-17
3	Fair (5-7)	18-22
4+	Fair (5-7)	23-26
4+	Poor (3-4)	27+

Margin-reflex distance: Patient fixates on torchlight held by the examiner and the distance between its corneal reflection and the upper lid margin is measured. A value of 4 to 5 mm is normal MRD.

Palpebral fissure height: Normally, the upper lid margin covers 2mm and lower lid margin covers 1mm of the cornea. Distance between the two is measured in the pupillary plane; 7 to 10 mm in males and 8 to 12 mm in females are normal.

Comparing it with the contralateral side and calculating the difference is used to quantify the unilateral ptosis as mild (1 to 2 mm), moderate (3 to 4 mm) or severe(4 mm or more).

Margin crease distance: MCD is the distance between the lid margin and skinfold of upper lid measured in downward gaze. Normal values are 7 to 8 mm in males, and 8 to 10 mm in females is considered normal. It is higher than normal in aponeurotic ptosis, whereas absent or vague in congenital ptosis.

Ancillary testing

Initiate a workup if the underlying etiology is unclear. A basic workup include a comprehensive metabolic panel, complete blood count, erythrocyte sedimentation rate and C-reactive protein.

Thyroid function panel and acetylcholine receptor antibodies if thyroid disease and/or myasthenia gravis are suspected.

In cases where a myopathy like CPEO is suspected, you can perform genetic testing, electromyography or even muscle biopsy.

If orbital signs are present, including an abnormal pupil exam or other cranial neuropathies, neuroimaging may be in order.

You can also order CTA or MRA if you suspect an aneurysm. If you suspect Horner syndrome, perform pharmacological testing as well.

TREATMENT

Non-surgical Treatment

Some cases of blepharoptosis don't need surgery, and are better treated with the following approaches.

Observation is an acceptable response to entities such as traumatic ptosis or some forms of neurogenic ptosis (e.g., oculomotor palsy from ischemia), which can improve spontaneously. Observation can also be appropriate in cases of aponeurotic ptosis that don't yet bother the patient.

Some cases respond best to a pharmacologic treatment. You should have optimal titration of systemic medication in myasthenia gravis patients and stability in thyroid patients prior to surgery. In cases of aberrant regeneration of the facial nerve resulting in synkinetic ptosis, botulinum toxin to the orbicularis oculi can improve the ptosis.

Ptosis repair can be classified into anterior and posterior approaches. The etiology, severity of ptosis, and levator function will often determine the most appropriate method. Regardless of the technique, ptosis repair can be performed in the office setting with local infiltrative anesthesia, or in the operating suite, the latter typically involving sedation.

The anterior approaches consist of

External levator advancement

This is the most common procedure. Though it can address a wide range of ptosis, it relies on the presence of a functioning levator. In the procedure, the surgeon advances the attenuated or dehisced levator musculo-aponeurotic junction inferiorly onto the superior border of the tarsus.

Small-incision techniques can offer the benefit of minimal scarring, but a traditional incision allows you to perform a simultaneous blepharoplasty.

Frontalis suspension

This procedure is a great option when there's minimal or no levator function.It allows you to bridge the frontalis

muscle to the superior tarsal plate so that raising the brows will result in a more successful elevation of the lid. The bridging material can be autoplastic (i.e., autogenous tensor fascia lata) or alloplastic (i.e., silicone rods, alloderm). Alloplastic materials, especially silicone rods, are most widely used in adults due to their ease of placement and adjustability.

If you feel a posterior approach would be better, consider

- Müller's muscle conjunctival resection (MMCR). This requires excellent levator function and is ideal for mild degrees of ptosis (1 to 2 mm). It does, however, require preoperative phenylephrine testing to ensure the viability of the Müller's muscle and the ideal candidacy for MMCR. MMCR would be indicated if you measure 1 to 2 mm of elevation of the upper lid 10 minutes after instillation of 2.5% phenylephrine. Surgical resection ranges between 6.5 and 9.5 mm, following the 4:1 rule: Perform 4 mm of resection for every 1 mm of elevation.14-16 MMCR remains a popular choice for mild ptosis because it's easy to perform and its results are predictable. Also, patients like that it doesn't result in a visible scar. However, conjunctival scarring and contour issues can be problematic.

Fasanella-Servat procedure. This procedure involves resection of the conjunctiva, Müller's muscle and the superior border of the tarsal plate. The surgeon usually performs 1 mm of lift for every 2 mm of tarsectomy or 2 mm of conjunctival-Müller resection. It, too, offers the benefit of avoiding a scar. However, tarsal instability and resection of accessory lacrimal glands often lead to dry eye, so this procedure has fallen out of favor.

Both anterior and posterior approaches are very successful in elevating the lid in the appropriate setting. Eyelid swelling, bruising, and varying degrees of discomfort are to be expected during the immediate postoperative period. Common complications include overcorrection, undercorrection, asymmetry and contour issues, thus making it one of the most challenging surgeries.

CONCLUSION

In conclusion, though the cause of a patient's blepharoptosis can be challenging to pin down, and you have to weigh the pros and cons of several surgical approaches, a thorough exam and careful surgery can usually help you achieve good results.

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