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Evaluation of Whitnall Sling Procedure for Moderate to Severe Congenital Blepharoptosis with Fair to Poor Levator Function

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Abstract

Background Blepharoptosis has a significant impact on patient functional status and may cause poor visual development in childhood and correction of congenital ptosis is one of the difficult challenges the ophthalmologist faces**.** Several surgical techniques were used for correction. The selection of one technique over another depends on several factors including the experience and comfort level of the surgeon with various techniques, the severity of ptosis and the degree of levator function.

Objective To Evaluate Whitnall sling procedure for moderate to severe congenital blepharoptosis with fair to poor levator function as a good choice to those whom frontalis sling procedure was there only option.

Methods Twenty five patients with different types of congenital blepharoptosis of moderate to severe degree and poor to fair levator function were received in Alwasity Hospital for Reconstructive Surgery and treated with Whitnall sling procedure. The results were evaluated according to the following criteria; Good: where the ptotic lid lies within 1 mm of normal lid position (1 mm below superior limbus) in primary gaze position. Moderate: postoperative lid position drooped more than 1 mm of normal lid position but maintained above the pupil. Poor: post operative lid position drooped to obscure the visual axis in primary gaze position.

Results 20 cases (80%) were having good results, 5 cases had moderate results (20%). There were no poor results. There was no need for additional tarsectomy in our cases.

Conclusion Whitnall sling procedure is a good choice for cases lying in the overlap zone between it and the frontalis sling procedure whenever the surgical indications and procedure of choice were concerned.

Keywords blepharoptosis, congenital lid ptosis, whitnal sling

Introduction

Blepharoptosis means vertical narrowing of palpebral fissure secondary to drooping of upper eye lid to a lower than normal position (which is defined as upper lid position 1 mm below the superior limbus) [1, 2]. It is considered as congenital when it's present at birth or diagnosed with in the first year of life [2]. It can occur as an isolated neuromuscular disorder (simple congenital ptosis) or be part of larger spectrum of local (peri ocular) or general birth defects (syndromic) [3]. The incidence of simple congenital ptosis is about 0.18 % [2]. It is unilateral in about 75% of cases [4]. It may be associated with the development of visual disturbances such as myopia, astigmatism, anisometropia, amblyopia and strabismus [2]. The possibility of amblyopia and associated refractive

defects make early detection and surgical treatment necessary when indicated and should be repaired as soon as possible when amblyopia could be provoked [5]. In congenital blepharoptosis, amblyopia is detected in about 20% of patients and is usually secondary to convergent strabismus, high astigmatism or anisometropia [4]. Deprivational amblyopia that is solely due to occlusion of papillary axis is rare and estimated to represent about 3% of amblyopias [4]. The ideal age for repair in unilateral cases that are not associated with the risk of deprivational amblyopia is 4-5 years [4]. Bilateral cases that are associated with bad head posturing habits should be addressed earlier [2].

Methods

Twenty five patients with different types of congenital ptosis who were presented to Al-Wasity hospital for plastic and reconstructive surgery have been evaluated for severity and levator function. The patients' data are summarized in tables 1-5.

Table 1. Age of incidence and types of ptosis

Type of ptosis	Age of incidence in years				
	0-3y	4-5y	6-10y	11-15y	>15y
Simple cong.ptosis	2	8	8	2	1
Blepharo phimosis				-	1
Marcus gun syndrome				1	2

Table 2. Laterality according to the type of ptosis

Type of ptosis	No. of cases	Unilateral	Bilateral
Simple congenital ptosis	21	18	3
Blepharophimosis	1	-	1
Marcus-gunn syndrome	3	3	-

Table 3. Associated anomalies according to the type of ptosis

Type of anomaly	Diagnosis	No. of cases
Strabismus (sup.rectus)	Marcus-gunn syndrome	1
Amblyopia		0
Ophthalmoplegia		0

Table 4: severity of ptosis according to types

Diagnosis	Moderate	Severe
Simple congenital ptosis	13 eyes	11 eyes
Blepharo phimosis	1 eye	1 eye
Marcus-gunn syndrome	3 eyes	-

Table 5. Levator function according to type of ptosis

Type of ptosis	Poor	Fair	Good	Excellent
Simple congenital ptosis	11 eyes	16 eyes		
Blepharophimosis	2 eyes			
Marcus gunn syndrome				

Classification of severity of blepharoptosis was as follows (after Levine) [4]: Mild = 2 mm; Moderate = 3 mm; Severe = 4 mm and more

Method of evaluation of severity of ptosis:

For unilateral blepharoptosis, the difference between the two palpebral fissures was considered as the severity of ptosis. For bilateral ptosis, MRD1 distance was depended where the normal MRD1 is considered as 4 - 4.5 mm [9].

Classification of levator functions (after Levine): Excellent = 12-15 mm; Good = 8-11 mm; Fair = 5-7 mm; Poor = 4 mm or less

Method of evaluation of levator function:

The distance from maximum down gaze to maximum up gaze is measured in millimeter with the eye brow fixed by thumb pressure.

Before surgery, all the necessary ocular and general examinations were undertaken. Whitnall sling procedure was adopted in all patients after thorough discussion with the patient's family. the following technique was used; all patients were operated upon under G.A, the palpebral crease was marked bilaterally preoperatively, after infiltration with 1:100 000 adrenaline and waiting for 7 minutes, skin incision is done on the premarked crease followed by incision of orbicularis oris muscle and undermining below the muscle to expose the orbital septum superiorly and tarsal plate inferiorly.

The orbital septum is then incised the whole length with scissors and after retraction of orbital fat identification of whitnall ligament is done. On the inferior side, the levator aponeurosis fibers are sharply separated from the anterior surface of tarsal plate and upward gentle dissection off the transparent conjunctiva is done gradually including the muller muscle with the aponeurosis. Laterally the lateral horn followed to the lateral orbital margin between the orbital and palpebral lobe of lacrimal gland and separated. Medially the medial horn is followed and separated from the medial orbital margin.

Now the levator aponeurosis attached to its muscle which can be tested for good excursion is advanced to be fixed at the level of whitnall ligament (which is included in the fixation) to the anterior surface of tarsal plate about 2 mm from superior margin starting with medial limbus stitch followed by lateral limbus stitch and then two additional medial and lateral stitches are added, 6/0 nylon is usually used. The level of the upper eye lid is checked after each stitch. The level is chosen to be with superior limbus, not above not below. After insetting of the muscle, the excess aponeurosis is trimmed leaving about 3mm cuff for any later adjustment needed. The orbicularis oculi muscle is fixed to the aponeurosis with two absorbable stitches and the skin is closed with subdermal interrupted stitches without external sutures, sterile strip is added.

Results

The following criteria were used for evaluation of results (after Wong) [1]; Good: post operative lid position is maintained within 1 mm of normal lid position (1 mm below superior limbus) in the primary gaze position. Moderate: Post operative lid position drooped more than 1mm below normal lid position. Poor: Post operative lid position drooped to obscure the visual axis in the primary gaze position. The follow up period ranged from 3 weeks to one year with an

average of 6 months. The results and complications are summarized in Table 6 and Table 7 consecutively.

Table 6: Results

Results	Good	Moderate	Poor
Simple congenital ptosis	21 eyes	3 eyes	-
Blepharophimosis	-	2 eyes	-
Marcus gunn syndrome	2 eyes	1 eye	-

Table 7. Complications

Condition	No. of eyes	Action
Over correction	1	Revision after one week
Conjunctival prolapse	1	Revision after 3 weeks
Crease asymmetry	1	Left
Absence of crease	1	Revision after one month
Lateral drooping	1	Revision after 6 months

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Discussion

Blepharoptosis has a significant impact on patient functional status and may cause poor visual development in childhood [(6)] and correction of congenital ptosis is one of the difficult challenges the ophthalmologist faces [(2)].

Figure 1 (a) a 5 year old boy with simple unilateral ptosis of severe degree with poor levator functions. (b) 6 weeks after whitnall sling operation.

In our series, there are three important aspects that worth discussion, these are the indication or choice of surgical technique, the technique itself and the evaluation of results. The selection of one technique over another depends on several factors including the experience and comfort level of the surgeon with various techniques, the severity of ptosis and the degree of levator function [(2)].

Figure 2 (a) Right sided severe congenital ptosis. (b) 6 weeks after whitnall sling surgery.

Allard and Durairag had mentioned that for children with < 3mm of levator function, surgical options include frontalis sling, frontalis muscle flap and whitnall sling procedures [(2)]. Considered that brow suspension is good only in bilateral ptosis, so he advocated conversion of unilateral

ptosis into bilateral by levator muscle excision on the normal side and bilateral fascia lata suspension [7]. Anderson considered that whitnall sling procedure is recommended for severe ptosis with levator function of 3-5 mm [2].

Figure 3. (a) Unilateral severe congenital ptosis. (b) 3 weeks after whitnall sling operation.

Lee has found in a retrospective study that whitnall sling (maximum levator aponeurosis resection) procedure was used for patients with severe ptosis associated with poor levator function interchangeably with frontalis suspension procedure [6].

Figure 4. Moderate left congenital ptosis with fair levator function. (b) 6 months after whitnall sling operation.

Durairaj had found that whitnall sling procedure and frontalis suspension procedure were used alternatively in case of failure of one of them [2]. Anderson in his original study on whitnall sling procedure had advocated its use in severe unilateral ptosis with levator function of 3-5 mm and opposite fissure height of 9mm or less [8].

Figure 5. (a) Moderate unilateral congenital ptosis (marcus-Gunn) syndrome. (b) 6 Weeks after whitnall sling operation.

When the technique is concerned, there are few points worth mentioning, 1st is levator horns preservation, the second is the preservation of Muller muscle and the third is adjustment techniques and the last is the addition of any additional procedures like tarsectomy or skin resection. Steven Dresner had mentioned that whitnall procedure is maximum levator aponeurosis advancement where the levator muscle whitnall ligament is sewn to tarsal plate without cutting the lateral horns of levator aponeurosis [9].

Custer had stressed that levator horns act as check ligaments limiting posterior excursion of the levator muscle and when dehisced it leads to over correction after simple reattachment of dehisced levator aponeurosis [10]. In fact we have found that resection of levator horns (when needed) and preserving the Whitnall sling is necessary to prevent under correction as intact levator horns decrease the levator excursion while cutting the whitnall sling will decrease the excursion. When the muller muscle is concerned, we elevate it in combination with levator aponeurosis as the latter is usually under formed

in moderate to severe congenital ptosis and this agree with Custer opinion.

Figure 6. (a) 3 year old girl with bilateral severe congenital ptosis. (b) one year after whitnall sling operation for the left eye and levator advancement for the right eye. The right eye was revised later with whitnall sling surgery (c).

For the adjustment, there are many techniques used for levator adjustment when performing the procedure under general anesthesia, of them are the predetermined 3-7 mm shortening of levator muscle for each 1mm ptosis degree depending on the amount of levator function [(4)]. The McCord gapping technique where a 3mm is added to the degree of ptosis for the amount the palpebral fissure that should be kept open on the table postoperatively or the shortening according to the difference of levator function in mm between the normal and abnormal side multiplied by a factor of 1.2 [(9)].

We have found that as long as we are going to do maximum levator resection, there is no point of predetermined measured shortening of levator aponeurosis and found that preoperative setting of lid level at the level of superior limbus or slightly (1 mm) higher in very poor levator function with fine tuning through cutting the levator horns or changing the level of fixation of whitnall ligament to the anterior tarsus is of benefit in adjustment. When all these measures fail to reach the goal, superior tarsectomy may become necessary and this may agree with Levine where he omitted cases of poor levator function from his table for the predetermined amount of levator resection [(4)].

Figure 7. (a) 25 year old female with moderate congenital left sided ptosis with previos failed Vassanella- servat operation.(b) one month after whitnall sling operation.

Holds et al in a series of 25 patients with severe unilateral ptosis with poor levator function used 4-5 mm external resection of superior tarsus with maximum aponeuroctomy (whitnall sling) and found that 68% (17 out of 25 patients) achieved lid height within 1mm of contralateral lid but all patients developed mild to moderate degree keratopathy that ultimately resolved in most patients [(11)].

Nissman had used whitnall sling procedure with superior tarsectomy in a case of compressive 3rd nerve palsy with complete blepharoptosis and zero levator function with successful results, but he did not mention about any complication [(12)].

This point may make us reluctant to do superior tarsectomy routinely in our cases.

Figure 8. (a) 22 year old female with bilateral severe congenital ptosis and poor levator function; she has had failed previous frontalis sling operation with suture material. (b) one month after whitnall sling operation bilaterally.

The last point to be discussed is the evaluation of the results and the follow up period, three stations for evaluation of results were adopted, the first is at the 7th post operative day where any decision for intervention for over or under correction is to be taken and this is agreed upon by almost all authors. the second station is 6 weeks postoperatively which is considered as the stable end point [6] where the evaluation of results as good, moderate or poor were taken and the final evaluation were done 6 months post operatively where any change of results were evaluated or any final revision was to be taken.

Anderson in a series of 69 patients who underwent whitnall sling procedure without tarsectomy, 30% of patients which were considered as satisfactory (lid height within 2 mm of contralateral lid) became unacceptable and required reoperation so he recommended the augmentation of Whitnall sling procedure with tarsectomy in most cases especially those with poor levator function [2]. This finding is not accordant with our results where we needed to intervene only in 2 patients (8%) after 6 months for problems diagnosed at the 1st 6 weeks but the intervention was considered as unnecessary by the parents at that early time. Our conclusion is that whitnall sling procedure is safe, easy, and practical and can be considered as an extensile technique for cases with moderate to severe ptosis with poor to fair levator function but surgeon should not fit all cases to this procedure.

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