

## Research Article

# The Ocular Outcome of Gold Weight Implant in the Patients with Lagophthalmos from Facial Nerve Palsy

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## Abstract

**Background:** The effect of lagophthalmos from facial nerve palsy was impaired visual acuity due to abnormal corneal integrity. Other than non-surgical treatments, the gold weight implant is one of the effective eyelid surgeries to correct lagophthalmos.

**Objective:** Review of the ocular outcomes of the gold weight implant in the patients with lagophthalmos from the facial nerve palsy since 2011 to 2022 in Neurological Institute of Thailand.

**Method:** Retrospective study of the patients with gold weight implant that consisted of the causes of facial nerve palsy, the weight of gold implanted, the visual acuity (VA), the frequency of artificial tear supplement, the surgical complications and other eyelid surgeries. The comparison of VA before and after the gold weight implant and frequency of artificial tears were analyzed using the statistics of Wilcoxon signed -rank test.

**Results:** There were 19 patients with the most common etiology is the vestibular schwannoma. Artificial tears were used in all patients. Temporary tarsorrhaphy and surgery for ectropion correction were done before gold weight implant. No extrusion occurred and one case with gold migration. The statistical analysis for comparison of the pre-and post- operative VA with Wilcoxon signed-rank test showed improvement insignificantly but the pre-and post- operative frequency of artificial tear supplements showed improvement significantly.

**Conclusion:** Gold weight implant is one of the effective procedures to correct lagophthalmos from facial nerve palsy and support the important outcome that is preservation of the vision. However, other ancillary eyelid surgeries may be considered for helping the better result of complete eyelid closure.

**Keywords:** Lagophthalmos; Facial nerve palsy; Gold weight implant

## Introduction

The effect of facial nerve palsy to the eye is the paralysis of the orbicularis oculi muscle which has the function of eyelid closure. Therefore, if these muscles are impaired, lagophthalmos is the consequence. Other manifestations that can be occurred are lower lid ectropion, brow ptosis, exposure keratitis, corneal abrasion or corneal ulcer that can be resulted in blindness. Therefore, the managements with non-surgical and surgical modalities to protect corneal integrity are especially important. The non-surgical treatments before eyelid surgery are corneal moisture with topical tear supplement and taping the lid closed. If the previous treatments are ineffective, the surgical procedures have the role [1-4]. There are varieties of lid surgeries including 1) temporary tarsorrhaphy, this procedure has the advantage of quick and repeatable surgery but poor cosmetic outcome and decrease the visual field [1,4]. 2) Lateral tarsal strip of the lower lid to correct the lower lid ectropion, this procedure helps the lid closed however; the lid cannot be covering the corneal exposure completely [3]. 3) Gold weight implant to the upper lid to correct lagophthalmos by the weight of the gold forcing the lid closure so the lagophthalmos reduced, corneal coverage improved and made the better cosmesis

[2,4-10].

This retrospective study is the study aimed to review the ophthalmic outcomes after the surgery of gold-weight implant procedure in the patients with lagophthalmos from the facial nerve palsy in the Neurological institute of Thailand since 2011-2022. The follow up of the ophthalmic results of all operated patients was done at least 1 year, post-operatively.

## Materials and Methods

The study reviewed the medical records of nineteen patients with lagophthalmos from facial nerve palsy who underwent gold-weight implant procedure since 2011-2022 in the Neurological institute of Thailand. The data collections from the medical records are the causes of facial nerve palsy, Bested Correct Visual Acuity (BCVA) using ETDRS chart, and ocular findings before surgery, medical treatment, and other lid surgeries before or in conjunction with the gold weight implant. Surgical complications followed, and the ocular outcomes were evaluated at least one year post-operatively. There were only two weight-types of the gold plate (1.0 gm and 1.2 gm) which were locally made from the foundation of Siriraj hospital. Before the surgery, we had to select the proper weight of the gold plate by placing the gold on the upper eyelid while the patients sat up in upright position until the complete eyelid closure was acquired, and the patients could tolerate it. Then, the procedure was done under local anesthesia. The skin was marked 1 mm to 2 mm higher than normal lid crease to decrease tension of the skin when the gold was inserted. We made the skin incision with no.15 blade and dissected the skin and orbicularis oculi muscles off the tarsus to form the pocket 2 mm above the eyelashes and tried to preserve the orbicularis oculi muscles to prevent the gold extrusion. Fixed the gold plate onto the tarsus at the junction between the medial to middle third of the tarsus with non-absorbable suture (Surgidac 5-0). Closed the orbicularis muscle with absorbable

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suture (Vicryl 6-0) interruptedly and closed the skin with 6-0 silk, interruptedly. The medical treatment was continued with topical tear supplements post-operatively, the patients were followed and reported the outcomes of follow up period at least 1 year. In the aspects of the surgical complication and the ophthalmic outcomes we analyzed with the non-parametric statistics of Wilcoxon signed -rank test.

## Results

The data of 19 patients were summarized in Table 1. The most common cause of facial nerve palsy resulting in lagophthalmos was vestibular schwannoma (84%), followed by petroclival meningioma and pontine hemorrhage, respectively. The median age ( $\pm$ SD) at gold weight implant was 58( $\pm$ 11.34) years ranging from 26 to 71 years. There were 11 (58%) patients loaded with 1.0 gm of gold. The median BCVA before and after gold weight implant was 20/40 and 20/30 respectively. All patients used artificial tears and had histories of abnormal corneal manifestations such as dry cornea to punctate epithelial erosion and corneal scar. Moreover, 11 in 19 patients had abnormal corneal sensation. Medical treatments with artificial tear eye drop, eye gel and taping lids were applied to all patients before gold weight implant. Six patients had history of temporary tarsorrhaphy to protect cornea and 7 patients with the lateral tarsal strip to correct pre-existing ectropion before gold weight implant and 6 with direct brow lift at the same time of gold weight implant to correct brow

ptosis in Table 2. One patient was referred due to impending corneal perforation from descemetocoele at 2-year post-operation.

In the surgical outcomes of the gold weight implant, there were no significant complications, only one patient had gold migration and was re-positioned at 1.5 years after previous surgery, one patient requested gold removal because of the third nerve palsy with complete ptosis from recurrent petroclival meningioma at 6-month post-operation and a case of gold removal because of skin reaction. In the comparison of the median BCVA pre-operatively and post-operatively was 20/40 (20/30-20/50) and 20/30 (20/25-20/40) respectively showed better VA but no statistical significance ( $p=0.073$ ). Moreover, the study reviewed the frequency of artificial tears application because it reflected the drug compliance. The study compared the median of the frequency of artificial tears supplement of 10 (10-14) times/day pre-operatively to the decrease of 4 (4-6) times/day post-operatively which showed the statistical significance ( $p=0.001$ ).

## Discussion

The effects of paralytic lagophthalmos from facial nerve palsy were corneal exposure that could result in visual impairment. Therefore, the management consisted of non-surgical and surgical aspects. For non-surgical aspects, the artificial tears, both eye drop and ointment associated with eyelid taping were the importance of treatment. If the

**Table 1:** Summary of the patient details.

Patient No.	Age/Sex	Etiology	Gold weight	Pre-operation		Post-operation		Complication	Remarks
				BCVA	Tear frequency	BCVA	Tear frequency		
1	58/F	Vestibular schwannoma, Lt	1.2 g.	20/32	4 times/day	20/25	4 times/day	No	
2	62/F	Vestibular schwannoma, Lt	1.0 g.	20/40	10 times/day	20/25	4 times/day	No	
3	46/F	Vestibular schwannoma, Lt	1.0 g.	20/50	14 times/day	20/100	14 times/day	No	NK with scar
4	46/F	Vestibular schwannoma, Rt	1.2 g.	20/63	6 times/day	20/25	4 times/day	No	NK
5	49/M	Vestibular schwannoma, Lt	1.2 g.	20/125	10 times/day	20/32	10 times/day	No	NK
6	45/F	Vestibular schwannoma, Rt	1.0 g.	20/25	10 times/day	20/20	4 times/day	No	
7	50/M	Vestibular schwannoma, Lt	1.2g.	20/20	10 times/day	20/20	4 times/day	No	
8	57/M	Vestibular schwannoma, Rt	1.2g.	20/50	10 times/day	20/20	6 times/day	No	
9	26/F	Vestibular schwannoma, Rt	1.0 g.	20/40	14 times/day	20/80	Refer	No	NK with descemetocoele
10	64/F	Petro-clival meningioma, Rt	1.0 g.	20/32	10 times/day	20/40	6 times/day	No	
11	65/F	Vestibular schwannoma, Lt	1.0 g.	20/25	10 times/day	20/25	4 times/day	No	
12	67/F	Vestibular schwannoma, Lt	1.0 g.	20/25	10 times/day	20/32	4times/day	No	
13	59/M	Vestibular schwannoma, Rt	1.0 g.	20/50	10 times/day	20/40	6 times/day	No	
14	71/M	Vestibular schwannoma, Lt	1.0 g.	20/40	14 times/day	20/40	4 times/day	No	
15	61/F	Vestibular schwannoma, Lt	1.2 g.	20/63	14 times/day	20/25	4 times/day	Migration	
16	43/F	Pontine hemorrhage	1.2 g.	20/63	14 times/day	20/40	10 times/day	skin reaction	Remove gold
17	60/F	Vestibular schwannoma, Lt	1.0 g.	20/32	6 times/day	20/32	4 times/day	No	
18	66/M	Vestibular schwannoma, Lt	1.2 g.	20/40	10 times/day	20/32	4 times/day	No	
19	42/F	Petroclival meningioma, Lt	1.0 g.	20/50	10 times/day	20/63	4 times/day	No	Remove gold due to third nerve palsy

F: Female; M: Male; Lt: Left Side; Rt: Right Side; BCVA: Best Corrected Visual Acuity; NK: Neurotrophic Keratitis

Post-Operation= follow up at least 1 year.

**Table 2:** Ocular finding and additional eyelid surgeries.

Patient No.	Corneal sensation	Bell's phenomenon	Other ocular findings	Surgeries before GWI	Surgeries at the time of GWI	Surgeries after GWI
1	normal	faired	Ectropion, brow ptosis		Direct brow lift	
2	normal	poor	Ectropion	LTS		
3	poor	faired				
4	normal	poor				
5	poor	poor		Temporary tarsorrhaphy	Direct brow lift	LTS
6	normal	normal				
7	normal	normal	Ectropion, brow ptosis	LTS	Direct brow lift	
8	decreased	poor	Ectropion	LTS		
9	poor	poor		Temporary tarsorrhaphy		
10	decreased	poor	Ectropion, brow ptosis	LTS	Direct brow lift	
11	decreased	normal	Ectropion, brow ptosis	Direct brow lift, LTS		
12	normal	poor				
13	decreased	normal		Temporary tarsorrhaphy	Levator advancement	Direct brow lift, LTS
14	normal	normal	Ectropion, brow ptosis		Direct brow lift	
15	normal	normal	Ectropion, brow ptosis	LTS		
16	decreased	faired	Ectropion, gaze palsy diplopia, nystagmus			EOM surgery
17	decreased	faired				
18	decreased	faired	Ectropion, brow ptosis	LTS	Direct brow lift	
19	decreased	poor		Temporary tarsorrhaphy		

GWI: Gold Weight Implant; LTS: Lateral Tarsal Strip; EOM: Extraocular Muscle

recovery of lid function delayed or incomplete, the surgical treatments had the role to protect cornea and vision [5,6]. The options of the surgeries like this study included tarsorrhaphy, lateral tarsal strip and upper lid weight that were gold weight implant. The function of gold weight was lid loading with the weight providing eyelid closure and it was a kind of surgery that had the low complication rate. The rate of extrusion reported 0%-48% [1-3,5,6,8], migration 8%-10% [1,4,9], excessive ptosis 15%-25% [1,9] and astigmatism 7%-24% [1,9]. In this study, all patients had the history of the medical treatment before and if it was not enough, the temporary tarsorrhaphy was done because it was the easy and quick technique to protect the cornea during the waiting of spontaneous recovery of the lagophthalmos, but when the lagophthalmos did not completely recovered, the gold weight implant became to the choice. In the aspect of ectropion of the lower lid, the lower cornea and conjunctiva exposed, so the lateral tarsal strip was the proper procedure to correct the laxing of the lower lid and decrease lagophthalmos. Direct brow lift was the procedure done at the same time as gold weight implant because it improved cosmesis and reduced pseudo-ptosis from brow ptosis. In the complications of gold-weight implant of this study, no one had extrusion and only 1 case (5%) had gold migration that corrected by re-position and 1 case (5%) had skin reaction with resolved after the gold weight was removed. In the aspects of visual outcome showed the improvement of the BCVA and better compliance of artificial tears because of decreased frequency of artificial tear applications as other study [4,10]. However, the limitation of this retrospective study was the gold weight implant was not the first procedure to correct the lagophthalmos because the price of gold that the patients could not afford so temporary tarsorrhaphy was the first choice and the gold weight implant was considered when incomplete lid closure caused corneal impairment and poor drug compliance. Another lid finding that is ectropion could not be corrected with the gold weight implant, so the lateral tarsal strip was the better procedure. Overall, the gold weight implant was not only the surgical procedure to correct lagophthalmos but the additional surgeries such as tarsorrhaphy, lateral tarsal strip, brow lift

also help the lid close with aesthetic acceptance as other studies [5,6]. Therefore, to correct lagophthalmos and preserve corneal integrity, only one surgical technique was rather not enough. In addition to surgical technique, the selection of the proper weight of gold should be considered. The previous study advised choosing the weight that held the lid about 1 mm lower than the lid of the other side [5,11]. In this study, there were only two types of gold weight, however, no unacceptable ptosis reported and the surgical outcomes could preserve the corneal integrity and vision.

In conclusion, gold weight implant is an effective procedure to correct lagophthalmos from facial nerve palsy. This surgery has a low complication rate and supports the important outcome that is preservation of the vision. However, other additional eyelid surgeries should be considered for helping the better result of complete eyelid closure under aesthetically acceptance.

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