Impact of early eyelid weight placement on the development of synkinesis and recovery in patients with idiopathic facial paralysis

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Abstract  Purpose: Determine the impact of upper eyelid weight placement at 3 months post onset of idiopathic facial paralysis (IFP) on the recovery of facial function in patients with lagophthalmos.

Methods: This is a retrospective review of patients with incomplete recovery of IFP—defined as a Sunnybrook Facial Grading Scale (FGS) score of less than 100, 3 months after onset. Only patients with FGS and Facial Clinimetric Evaluation (FaCE) scores recorded at 3 and 12 months were included. Patients were categorized into 3 groups: Group A, lagophthalmos with eyelid weight placement; Group B, lagophthalmos without eyelid weight placement; Group C, complete eye closure (CEC) without eyelid weight placement. The eye comfort domain and composite score of the FaCE questionnaire were analyzed. Voluntary eye closure, synkinesis with eye closure, overall synkinesis and the composite score of the FGS were also analyzed. Paired two-tailed t-test was used to evaluate the data comparing the 3 and 12 month FaCE and FGS scores within and between the 3 groups.

Results: The change in composite FGS score significantly increased from month 3 to month 12 in Group A as compared to Group B (37 vs 4.25, \( P < 0.01 \)). While Group A had significantly lower eye comfort (−12.5, \( P = 0.01 \)), voluntary eye closure (−1.75, \( P = 0.05 \)) and overall...
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FGS scores (−28.75, P = 0.04) at 3 months compared to those in Group C, there were no differences between these two groups at 12 month follow-up.

Conclusions: For patients with lagophthalmos at 3 months, early eyelid weight placement may lead to improved facial function at 12 months.

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Introduction

Acute idiopathic facial paralysis (IFP), also known as Bell’s palsy, presents as unilateral weakness or paralysis of the face due to acute dysfunction of the peripheral facial nerve without identifiable cause. This phenomenon often leads to distinct cosmetic and functional consequences contributing to both psychological and physiologic concerns.1,2 Although the majority of cases resolve spontaneously without treatment, approximately 26% of cases will result in permanent facial nerve dysfunction, ranging from complete paralysis to partial recovery.3 Given that the incidence of permanent facial nerve dysfunction, ranging from complete paralysis leading to facial paralysis (i.e., facial trauma, acoustic neuroma) were excluded from the study.

Of the 96 patients with a diagnosis of idiopathic facial palsy, 11 patients met the criteria for inclusion in this study. These patients were then categorized into 3 groups: Group A, lagophthalmos who then underwent eyelid weight placement (n = 4); Group B, lagophthalmos without eyelid weight placement (n = 4); Group C, complete eye closure (CEC) without eyelid weight placement (n = 3).

Statistical analyses were conducted based on the FaCE and FGS surveys. For the FaCE questionnaire, the eye comfort domain and the composite scores were analyzed. For the FGS questionnaire, the domains of voluntary eye closure, synkinesis with eye closure, overall synkinesis, and overall composite score were analyzed. Paired two-tailed t-test was used to evaluate the data comparing the 3 month and 12 month FaCE and FGS scores within and between the 3 groups.

Results

The four patients in Group A underwent eyelid weight placement (96.3 ± 21.5) days after the onset of IFP. Of note, Group A data at 3 months is taken from prior to the placement of the eyelid weight. Table 1 shows the results of the various domains from the FGS and FaCE questionnaires within each group. Group A demonstrated a statistically significant improvement in eye comfort (+41.67, P = 0.004) and voluntary eye closure (+1.75, P = 0.02) and overall FGS (+37, P = 0.05) at 12 months. Group B notably experienced a significant increase in both synkinesis with eye closure (+3.5, P = 0.05) as well as overall synkinesis (+6.25, P = 0.01). Group C patients did not demonstrate any significant changes in FaCE or FGS domains.

Comparison of Group A and Group B showed no significant differences at 3 months in the FGS or FaCE domains. Evaluation of these two groups at 12 months revealed a significant increase in the change of the composite FGS score for those in Group A compared to those in Group B (+37 vs + 4.25, P = 0.02). A trend towards significance was noted for Group A in the
domains of improved eye control, synkinesis with eye closure and overall synkinesis from 3 months to 12 months. There were no differences in the change in scores for voluntary eye closure and synkinesis with closure between the two groups (Table 2).

Comparison of Group A and Group C at 3 months revealed Group A had significantly lower eye comfort (\(C_0-12.5, P < 0.01\)), voluntary eye closure (\(C_0-1.75, P = 0.02\)) and overall FGS scores (\(C_0-28.75, P = 0.04\)) (Table 3). At the 12 month follow-up, there were no differences in the FaCE and FGS domains between these two groups.

Lastly, comparison of Group B and Group C at 3 months revealed Group B had a significantly lower overall FGS score (\(C_0-24.35, P = 0.05\)) (Table 4). At the 12 month follow-up, the overall FGS score remained significantly lower for Group B (\(C_0-35, P = 0.02\)). A trend towards increased overall synkinesis was also noted for Group B at 12 months.

### Discussion

Facial synkinesis is a distressing life-long morbidity to patients with incomplete recovery after IFP. Uncontrolled synkinesis causes significant muscular tension and uncoordinated changes in facial expression in the static and dynamic postures.\(^{10,11}\) While surgery, selective chemodenervation (onabotulinum toxin-A injection), and physical therapy are all utilized for the management of synkinesis once it has developed, to date there has been no study regarding surgical interventions aimed at the prevention of synkinesis.

In our study, patients with lagophthalmos at 3 months had significantly lower scores in eye control and overall FGS compared to patients with CEC. Interestingly, comparison of the lagophthalmos with eyelid weight placement and the CEC without eyelid placement patients at 12 months revealed no significant differences in any category. In addition, for patients with lagophthalmos, early eyelid weight placement lead to improvement in the change in overall FGS with a strong trend towards decreased ocular synkinesis and overall synkinesis when compared to those

### Table 1

| Group   | Domains                  | 3 month | 12 month | Difference | P-value |
|---------|--------------------------|---------|----------|------------|---------|
| Group A | Eye Comfort              | 37.5    | 79.17    | +41.67     | 0.004   |
|         | Total FaCE               | 56.5    | 75       | +18.5      | 0.20    |
|         | Voluntary Eye Closure    | 3.25    | 5        | +1.75      | 0.02    |
|         | Synkinesis with eye closure | 0.25  | 0.5      | +0.25      | 0.52    |
|         | Overall Synkinesis       | 0.25    | 1.5      | +1.25      | 0.18    |
|         | Overall FGS              | 32.25   | 69.25    | +37        | 0.05    |
| Group B | Eye Comfort              | 45.83   | 68.75    | +22.92     | 0.50    |
|         | Total FaCE               | 54.43   | 61.5     | +7.07      | 0.31    |
|         | Voluntary Eye Closure    | 3.75    | 5.25     | +1.5       | 0.28    |
|         | Synkinesis with eye closure | 0    | 3.5      | +3.5       | 0.05    |
|         | Overall Synkinesis       | 0.25    | 6.5      | +6.25      | 0.01    |
|         | Overall FGS              | 36.65   | 41       | +4.35      | 0.68    |
| Group C | Eye Comfort              | 50      | 87.5     | +37.5      | 0.12    |
|         | Total FaCE               | 63.5    | 72       | +8.5       | 0.20    |
|         | Voluntary Eye Closure    | 5       | 5        | 0          | 1       |
|         | Synkinesis with eye closure | 0.33  | 1        | +0.67      | 0.42    |
|         | Overall Synkinesis       | 2       | 3.33     | +1.33      | 0.61    |
|         | Overall FGS              | 61      | 76       | +15.5      | 0.31    |

### Table 2

| Domains                  | Group A | Group B | P-value |
|--------------------------|---------|---------|---------|
| Eye Comfort              | +41.67  | +22.92  | 0.09    |
| Total FaCE               | +18.5   | +7.07   | 0.15    |
| Voluntary Eye Closure    | +1.75   | +1.5    | 0.69    |
| Synkinesis with Eye closure | +0.25  | +3.5    | 0.08    |
| Overall Synkinesis       | +1.25   | +6.25   | 0.06    |
| Overall FGS              | +37     | +4.35   | 0.01    |

### Table 3

| Time   | Domains                  | Group A | Group C | P-value |
|--------|--------------------------|---------|---------|---------|
| 3 month| Eye Comfort              | 37.5    | 50      | 0.01    |
|        | Total FaCE               | 56.5    | 63.5    | 0.34    |
|        | Voluntary Eye Closure    | 3.25    | 5       | 0.05    |
|        | Synkinesis with Eye closure | 0.25  | 0.33    | 0.79    |
|        | Overall Synkinesis       | 0.25    | 2       | 0.36    |
|        | Overall FGS              | 32.25   | 61      | 0.04    |
| 12 month| Eye Comfort              | 79.17   | 87.5    | 0.49    |
|        | Total FaCE               | 75      | 72      | 0.88    |
|        | Voluntary Eye Closure    | 5       | 5       | 1       |
|        | Synkinesis with Eye closure | 0.5   | 1       | 0.53    |
|        | Overall Synkinesis       | 1.5     | 3.33    | 0.32    |
|        | Overall FGS              | 69.25   | 76      | 0.68    |
that did not have an eyelid weight. These findings suggest that eyelid loading in patients with lagophthalmos at 3 months post-onset may help to move them to a higher place on the facial nerve recovery curve and may help decrease the risk for developing synkinesis. Although we were unable to identify a specific area of improvement on the FaCE and FGS questionnaires, our results support a global improvement in facial function.

Although an association between lid loading and decreased synkinesis does appear to exist, the causal relationship remains hypothetical as there are currently no studies in the literature assessing the mechanism by which eyelid loading can improve recovery of facial function following idiopathic facial paralysis. However, there are studies that detail the relief of blepharospasm with the use of eyelid loading.\textsuperscript{14,15} These studies have shown that eyelid loading passively increases the amplitude of paretic eye closure as well as the degree of closure relative to the normal eye, which ultimately decreases peripheral feedback involvement in the maladaptive control of blinking.\textsuperscript{12,16}

Expounding on this theoretical foundation about the use of eyelid loading in the treatment of blepharospasm, we hypothesize that there are likely benefits to overall facial recovery when an eyelid weight is placed in an IFP patient with IEC. In patients with more severe facial paralysis, attempted eye closure requires extensive recruitment of musculature beyond just the orbicularis, which can promote a greater degree of aberrant nerve regeneration.\textsuperscript{12,13} The improvement from placement of an eyelid weight in these patients most likely relates to beneficial biofeedback loops that allow for less excessive recruitment of non-orbicularis facial musculature and therefore less synkinesis.

The majority of patients suffering from IFP initially present to an emergency or primary care setting.\textsuperscript{17,18} Unfortunately, referral to facial paralysis experts is often delayed until sought out by the patient, which may be a reason for our low number of patients meeting inclusion criteria. This limitation emphasizes the importance of working toward a multidisciplinary approach in the treatment of patients with IFP, ensuring that providers who treat facial palsy and the associated ocular complications are aware of the resources available for those patients. Given our data in conjunction with the previously well-established risk of a lower chance of recovery with a longer duration of illness,\textsuperscript{3} we highly recommend early (<3 month) referral to experts for patients with incomplete recovery of IFP. We believe patients with incomplete recovery of IFP should be counseled on the potential risks and benefits of upper eyelid loading early in their course of paralysis, as this intervention may have a long-term benefit to their overall recovery.

Table 4 FaCE and FGS scores at 3 months and 12 months for Group B vs Group C.

| Time     | Group B | Group C | P-value |
|----------|---------|---------|---------|
| 3 month  |         |         |         |
| Eye Comfort | 45.83   | 50      | 0.24    |
| Total FaCE  | 54.43   | 63.5    | 0.30    |
| Voluntary Eye Closure | 3.75    | 5       | 0.12    |
| Synkinesis with Eye Closure | 0    | 0.33    | 0.20    |
| Overall Synkinesis | 0.25    | 2       | 0.35    |
| Overall FGS | 36.65   | 61      | 0.05    |
| Eye Comfort | 68.75   | 87.5    | 0.49    |
| Total FaCE  | 61.5    | 72      | 0.66    |
| Voluntary Eye Closure | 5.25    | 5       | 0.88    |
| Synkinesis with Eye Closure | 3.5    | 1       | 0.10    |
| Overall Synkinesis | 6.5     | 3.33    | 0.06    |
| Overall FGS | 41      | 76      | 0.02    |

Conclusion

This study emphasizes the importance of early identification of patients with a lower likelihood of recovery from IFP. Our findings suggest that patients with lagophthalmos at 3 months may benefit from an upper eyelid loading procedure to help optimize facial function and potentially decrease the risk of developing synkinesis. Further research is needed to delineate the specific timing and indications for undergoing eyelid loading procedures in patients suffering from this condition.

Declaration of Competing Interest

None.

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