Effectiveness of Combined Electrical Stimulation and Kinesiology Taping in the Rehabilitation of Bell's Palsy: A Case Study

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Abstract

Introduction: Bell's Palsy is an acute peripheral facial nerve paralysis that leads to sudden weakness of facial muscles, significantly affecting both physical function and social interaction. Early physiotherapeutic intervention plays a crucial role in recovery. This case study investigates the effectiveness of combining neuromuscular electrical stimulation and kinesiology taping in the rehabilitation of a patient with acute Bell's Palsy. **Method**: A 55-year-old male diagnosed with right-sided Bell's Palsy presented with difficulty in facial movements, chewing, eye closure, and oral control following exposure to cold air and a history of ear infection. Treatment began on the same day of diagnosis. The intervention included daily sessions of interrupted galvanic (IG) electrical stimulation targeting facial muscles (Frontalis, Corrugator, Orbicularis Oculi, Buccinator, Orbicularis Oris, Nasalis, and Mentalis) with 30 contractions per muscle, followed by assisted facial muscle exercises and kinesiology taping applied from origin to insertion on the affected muscles. The taping was reapplied daily for seven consecutive days. Outcome measures included the Facial Disability Index (FDI) and the Facial Clinimetric Evaluation (FaCE) scale, assessed on day 1 and day 10. **Result**: The FDI physical function score improved from 16.5 to 110, and the social function score improved from 20 to 88 after seven days. The FaCE scale score increased from 25 to 100 by day 10. These results indicated substantial improvement in facial muscle control, symmetry, and patient-reported quality of life**. Conclusion**: The combined use of neuromuscular electrical stimulation and kinesiology taping proved to be an effective early intervention in the rehabilitation of Bell's Palsy, contributing to significant functional recovery within a short duration. Further research with larger sample sizes is recommended to validate and standardize this approach in clinical settings.

Key word: Bell's palsy, kinesiological tapping, Electrical stimulation, facial Disability Index

Introduction:

Bell's Palsy is an acute, idiopathic, unilateral facial nerve (cranial nerve VII) paralysis that leads to sudden weakness or paralysis of the facial muscles on one side of the face. It is commonly attributed to inflammation or viral infections, such as herpes simplex virus, which cause swelling and compression of the facial nerve as it passes through the temporal bone. Patients typically present with facial asymmetry, drooping of the mouth, incomplete eye closure, and difficulty in facial expressions, significantly impacting their quality of life.

Conventional physiotherapeutic management of Bell's Palsy includes facial exercises, massage, and electrotherapy. Among electrotherapeutic interventions, electrical stimulation has been widely used to promote facial muscle contraction, prevent atrophy, and stimulate nerve regeneration. Electrical stimulation offers direct activation of motor units, aiding in muscle re-education and improving functional recovery when applied appropriately and safely.

In recent years, kinesiology taping has emerged as a complementary technique in neuro-muscular rehabilitation. Kinesiology tape is an elastic therapeutic tape applied on the skin to provide mechanical support, improve blood and lymphatic circulation, reduce swelling, and facilitate neuromuscular feedback. In Bell's Palsy, it may help lift soft tissues, reduce facial edema, and support proper muscle alignment, thereby enhancing the effects of facial rehabilitation.

While both modalities have been used independently in facial nerve recovery, the combined effect of electrical stimulation and kinesiology taping in Bell's Palsy remains relatively under-explored. The rationale behind their combination lies in their potential synergistic effect—while electrical stimulation activates the muscles internally, kinesiology taping provides external neuromuscular support and sensory feedback.

This case study aims to investigate the effectiveness of a combined rehabilitation approach using electrical stimulation and kinesiology taping in an individual diagnosed with Bell's Palsy. The goal is to assess whether this integrative intervention leads to improved facial symmetry, muscle strength, and functional recovery within a clinical time frame, thereby offering insights for broader clinical application.

Case Presentation:

Method: A 55-year-old male presented to the physiotherapy department with complaints of sudden onset weakness on the right side of his face. The patient reported difficulty in chewing food, drinking water, and an inability to fully close his right eye. These symptoms began in the morning following an overnight journey during which he was exposed to cold air in a low-temperature environment. He also reported a recent history of ear infection a few days prior to the onset of facial weakness.

Upon experiencing these symptoms, he sought medical attention at a nearby hospital, where a neurological examination was conducted. Based on the clinical presentation and history, the patient was diagnosed with Bell's Palsy, a unilateral lower motor neuron facial nerve paralysis. The attending physician referred him for immediate physiotherapy to initiate early intervention.

The patient arrived at the physiotherapy department on the same day of diagnosis. On physical examination, marked asymmetry of facial muscles was observed, particularly affecting the right side. He exhibited an inability to raise his right eyebrow, incomplete eye closure (lagophthalmos), drooping of the mouth angle, and decreased strength during voluntary facial expressions.

The outcome measures used for this case study included the Facial Disability Index (FDI)[1] and the Facial Clinimetric Evaluation (FaCE)[2] scale, assessed pre- and post-intervention to evaluate the effectiveness of the combined treatment approach.

The physiotherapy treatment protocol incorporated neuromuscular electrical stimulation using Interrupted Galvanic (IG) current targeted to specific facial muscles.

The following muscles were stimulated individually:

Frontalis, Corrugator, Orbicularis Oculi, Buccinator, Orbicularis Oris, Nasalis and Mentalis. For each muscle, 30 contractions were elicited using appropriate electrode placement and intensity settings to achieve visible, comfortable muscle contractions without causing discomfort.

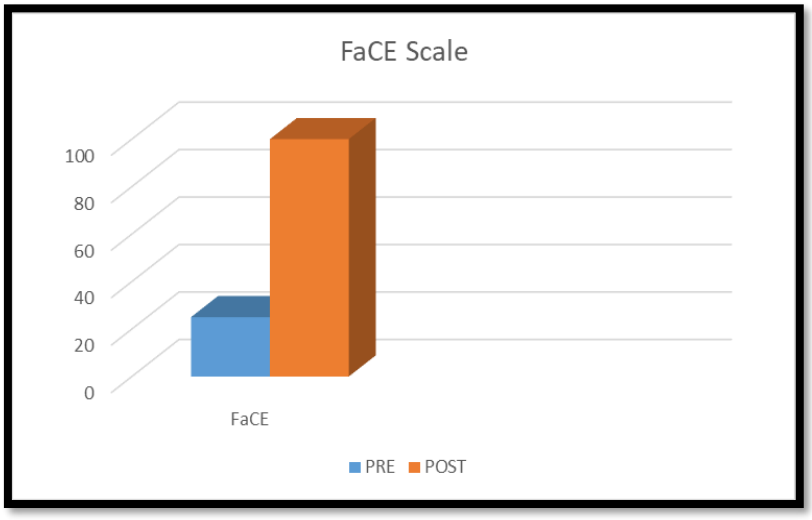
Immediately after electrical stimulation, assisted facial muscle activation exercises were performed, encouraging the patient to actively attempt facial movements such as raising the eyebrows, closing the eyes, smiling, puckering the lips, and blowing air with physiotherapist guidance. This helped to reinforce neuromuscular control and promote functional re-education.

Following the exercises, kinesiology taping was applied to facilitate muscle activation and provide sensory input. Tape was applied according to standard kinesiology taping principles, from origin to insertion to promote facilitation of the targeted muscles. The application procedure was as follows:

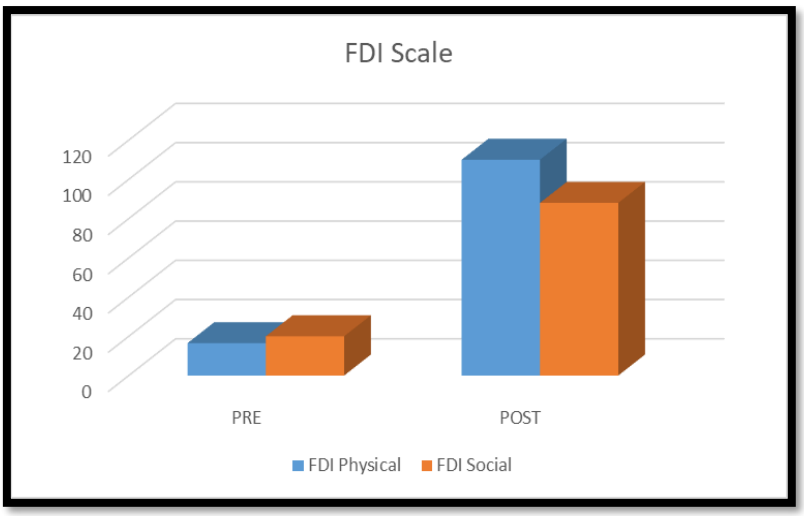
- **Frontalis muscle**: Two parallel strips of tape were applied from the forehead to just above the eyebrow level.
- **Orbicularis Oculi**: A small circular tape was gently placed around the eye to support the muscle in a rounded fashion.
- **Buccinator muscle**: A strip was applied diagonally from the area near the ear towards the corner of the nose.
- **Orbicularis Oris**: A circular tape was applied around the mouth, tailored to the contour and size of the muscle.

The length of each tape was customized according to the size of the muscle being targeted. Proper anchor placement and stretch percentage were maintained based on kinesiology taping guidelines for muscle facilitation. After applying the tape, it was gently rubbed to activate the adhesive and enhance its therapeutic effect. The tape was kept on for approximately 24 hours and removed the following day prior to electrical stimulation. After the stimulation and exercises, fresh tape was reapplied using the same technique. This treatment cycle was repeated daily for seven consecutive days.
At the end of the intervention period, post-treatment assessments were conducted using the FDI and FaCE scales to compare functional and clinical improvements from baseline.

Result:
On the day of initial assessment, the Facial Disability Index (FDI) score was recorded as 16.5 in the Physical Function domain, and 20 in the Social Function domain. After seven days of combined treatment, the scores significantly improved to 110 in the Physical Function domain and 88in the Social Function domain. These results indicate a substantial enhancement in both physical and social aspects of facial function.
The second outcome measure, the Facial Clinimetric Evaluation (FaCE) scale, showed a baseline score of 250n the same day of assessment. After ten days of intervention (seven continuous days of treatment), the FaCE score improved remarkably to 100. This significant change reflects considerable improvement in the patient's overall facial function.
The FaCE scale comprehensively evaluates multiple domains, including facial movement, facial expression, oral function, and social interaction, making it a reliable tool to assess the effectiveness of facial rehabilitation. The notable improvements in both FDI and FaCE scores suggest that the combined use of electrical stimulation and kinesiology taping was highly effective in accelerating recovery in this case of Bell's Palsy.



Graph 1. Comparison of Pre and Post FaCE Score



Graph 2. Comparison of Pre and Post FDI score

Discussion

The present case study demonstrated significant improvements in facial function following a seven-day intervention combining electrical stimulation and kinesiology taping in a 55-year-old male diagnosed with Bell's Palsy. The post-treatment outcome scores on the Facial Disability Index (FDI) and Facial Clinimetric Evaluation (FaCE) scale showed marked improvements, indicating the effectiveness of this integrative therapeutic approach.

The FDI scores improved from 16.5 to 110 in the physical function domain and from 20 to 88 in the social function domain, reflecting notable recovery in both motor function and psychosocial well-being. Similarly, the FaCE scale score increased from 25 to 100, suggesting a comprehensive improvement in facial movement, expression, and oral function.

These findings are supported by a recent study by Bulstrode et al. (2022), which reported that early use of electrical stimulation in acute Bell's Palsy cases can enhance motor recovery by promoting targeted muscle contraction and preventing disuse atrophy, especially when started within the first week of symptom onset [3].

Additionally, a 2023 randomized controlled trial by Lee and Kim explored the effect of kinesiology taping in facial paralysis and found that applying tape to facial muscles significantly improved muscle alignment, reduced edema, and provided beneficial proprioceptive feedback, resulting in faster functional recovery compared to exercise alone [4]. These results align with the current case study, where kinesiology taping was applied post-exercise and maintained for extended hours to enhance neuromuscular facilitation.

The synergistic effect of electrical stimulation activating facial muscles internally, combined with the external sensory input and muscle facilitation provided by kinesiology tape, appears to accelerate the recovery process. The structured application technique covering the frontalis, orbicularis oculi, buccinator, and

orbicularis oris also ensured that the most affected facial regions were consistently supported during the critical healing period.

Overall, the results from this case study support the integration of electrical stimulation and kinesiology taping as an effective, non-invasive, and practical approach in the early rehabilitation phase of Bell's Palsy, potentially leading to quicker and more complete recovery.

Conclusion

This case study highlights the positive effects of combining neuromuscular electrical stimulation and kinesiology taping in the early rehabilitation of Bell's Palsy. The significant improvements observed in both the Facial Disability Index (FDI) and Facial Clinimetric Evaluation (FaCE) scales over a short intervention period indicate that this integrative approach can effectively enhance facial muscle function, symmetry, and overall quality of life. Early physiotherapy intervention, particularly within the acute phase, appears to be crucial for optimizing recovery outcomes. The synergistic application of electrical stimulation to activate muscles and kinesiology tape to facilitate and support muscle movement offers a promising, non-invasive strategy for accelerating recovery in patients with unilateral facial paralysis.

Future Recommendation

Larger-scale clinical trials should be conducted to further validate the effectiveness of combined electrical stimulation and kinesiology taping in Bell's Palsy rehabilitation. Comparative studies should be designed to assess the benefits of this combined approach against conventional therapy or individual modalities used alone.

Conflict of Interest

No conflict of Interest

Acknowledgement

I thank to my patient that gave me valuable time and support

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