

Effectiveness of Motor Imagery and Mirror Book Therapy for the Recovery In Patients with Acute Bell's Palsy: A Pilot Study

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ABSTRACT

Background: Bell's palsy is an acute-onset peripheral facial palsy and is the commonest cause of LMN palsy. Facial resting symmetry and expressions are determining factors of facial attractiveness & being a marker of good health. The study aims to compare the effect of motor imagery and mirror book therapy for recovery in patients with acute Bell's palsy.

Methods: Total 20 Patients suffering from acute Bell's palsy were included in the study. Baseline data were collected with the use of SFGS and FDI. The patients were given conventional electrotherapy and Motor Imagery and Mirror book therapy. After four weeks, the patients were evaluated again.

Conclusion: The data were analyzed using the paired t-test. The present study concluded that Motor Imagery and Mirror Book Therapy improved Facial Function and Facial Symmetry in patients with acute Bell's palsy.

KEYWORDS: Acute Bell's Palsy, Motor Imagery, Mirror Book Therapy, Conventional Electrotherapy.

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INTRODUCTION

Bell's Palsy is named after the Scottish Anatomist Sir Charles Bell (1774-1842), who first described it. Bell's Palsy is the most common acute idiopathic disorder associated with peripheral nerve palsy of the facial nerve supplying all the muscles of facial expression [1,2].

The annual incidence of Bell's palsy is 15 to 30 per 100,000 persons, with equally affected in both genders [2,3]. Bell's palsy has been described in patients of all ages, with peak incidence noted in the 40s [2,4].

Difficulty in closing the affected side eyes, facial deviation to the unaffected side, and difficulty in drinking, eating, and speaking are

the common problems associated with the acute phase of Bell's palsy. Psychological problems associated with facial appearance are the main factor that affects the individual personally in any phase of Bell's palsy [5-8]. Thus, it causes functional deficits, affects facial expressions, and impacts the individual's quality of life [9,10]. The proper assessment and treatment are imperative for accomplishing the ideal recuperation of facial nerve function. Bell's palsy patients may benefit from specific physiotherapy interventions that will improve their physical and psychosocial functions [11]. Bell's palsy is frequently treated with patient education and various physical therapy interventions, including

kinesiotherapy, massage therapy, cryotherapy, and electrotherapy [12].

The Motor Imagery technique has been described as the Mental Representation of movement without any body movement. Literature shows the positive effects of motor imagery on motor learning and performance improvement in athletes, healthy individuals, and individuals with neurological conditions (e.g., stroke, spinal cord injury, Parkinson's disease) [13,14]. Motor imagery allows the patient to attentively perceive a movement, without an absolute reconstructing link between the perception and movement. The application of Motor Imagery, which is always applied as rehabilitative protocols with Mirror Therapy before rehabilitative exercises.

Mirror Therapy is a safe and simple-to-use intervention for the recovery of stroke patients and phantom limb pain, also that can be an acceptable method to other neurological conditions [15]. In one study mirror book therapy uses as a bifold mirror to twice reflect the unaffected half of a patient's face, such that the patient sees a full, unaffected face, this is an adaptation from the mirror box originally created by Ramachandran to treat phantom limb pain and paralysis [16,17].

Paolucci Teresa et al. suggested that the mirror therapy, and its association with motor imagery that inspired the patient to imagine the movement before executing it, allowing to perceive the improve movement in the facial paresis over visual feedback by viewing the reflection of the intact face in place of the facial palsy sensory feedback, in which the face moved symmetrically [14].

There is dearth of evidence that proposes the effectiveness of motor imagery and mirror book therapy in improving facial symmetry in acute bell's palsy. Hence the need arises to evaluate the effectiveness of the motor imagery and mirror book therapy on the recovery in Bell's palsy patients.

MATERIALS AND METHODS

The interventional comparative study was performed between November 2021- May 2022 at Vadodara including 20 patients with acute Bell's Play. The inclusion criteria were

patients who have sufficient physical, mental ability to understand instructions, aged between 18-60 years, and referred for Physiotherapy within one week of onset. The exclusion criteria were patients with previous history of peripheral facial paralysis, facial palsy due to supranuclear lesion or known cause of infections, CNS tumor, patients with skin allergy problems on face, history of trauma to skull bone or undergone facial surgery, patients with psychiatric disorders.

The patients were treated with Motor imagery & Mirror book therapy along with conventional electrotherapy

Conventional Electrotherapy: It included infrared radiations (up to 7 days from the date of onset) to the affected side followed by electrical stimulation (Interrupted Galvanic current) of affected muscles with three sets of 30 contractions [8,12].

During the session, the participants first performed the motor imagery technique. The instructions for the participants to perform the motor imagery techniques are as follows [18]: Close the eyes, relax the face, and concentrate on doing sufficient complete and symmetrical movements of the face. Patients were told to perform the following exercises: Lift and frown the eyebrows, open and close the eyes, pout, wrinkle nostrils, smile with an open and closed mouth, and inverted smile. Repeat five times each with a 5-second pause between each visualization. The patients performed the mirror book exercises for the Mirror book therapy session. The patient sat upright with the mirror at the patient's eye level. The mirror was opened to a right angle, with the nose touching the outer edge of the mirror. The patient looked into the mirror with both eyes open, and only the unaffected half of the face reflected. The patient should see the unaffected side of the face twice reflecting, giving the appearance of a full-face reflection. After that, the patient was requested to perform the following therapist commands: gently raise the eyebrows, frown the eyebrows, wrinkle your nose gently and briefly, smile with a closed mouth, smile with an open mouth, pout, gentle inverted smile, close and open the eyes very slowly. Each movement was

released gently and performed randomly [16]. Rest repetitions: 5 times each. Contraction/Rest time: Hold the contraction for 3 seconds, and rest for 3 to 5 seconds. Intervention protocol was given for four weeks and three days per week, lasting 45 to 60 min.

RESULTS

Table 1: Comparison of patients' Pre and Post Intervention measurement with respect to total SFGS and its dimensions scores by paired t-test.

Group A	Components	Pre-Intervention		Post Intervention		t- value	p-value
		Mean	SD	Mean	SD		
SFGS	Resting symmetry	19.5	1.58	14	3.16	6.12	0.0002**
	Voluntary movement	33.6	5.71	45.2	9.43	7.12	<0.0001**
	Synkinesis	0.5	1.58	0.3	0.94	1	0.343
	Composite score	13.6	6.86	30.9	11.51	8.39	<0.0001**

Note: *p value<0.05 significant, p value>0.05 not significant

Table 2: Comparison of patients' Pre and Post Intervention measurement with respect to total FDI and its dimensions scores by paired t-test.

Group A	Components	Pre-Intervention		Post Intervention		t- value	p-value
		Mean	SD	Mean	SD		
FDI	Physical function	38.5	9.44	77	12.29	8.48	0.0001*
	Social function	40.8	4.13	78.8	13.07	9.8	0.0001*
	Total	79.3	12.01	155.8	21.87	11.33	0.0001*

Note: *p value<0.05 significant , p value>0.05 not significant

DISCUSSION

The study aimed to determine the effect of motor imagery and mirror book therapy on recovery in patients with acute Bell's palsy. The patients were treated with (Motor Imagery and Mirror Book Therapy). To assess the severity of facial nerve palsy, the SFGS was used. The quality of life was assessed by an FDI score that includes two components: physical function and social function. The evaluation was done before and after the intervention protocol.

Table 1 compares the mean value for the SFGS score of patients with Bell's palsy. The mean value of the SFGS score for pre-intervention was 13.6±6.86, and the mean value of post-intervention was 30.9±11.51. Thus, the present study concluded that the SFGS score was improved after four weeks of intervention, suggesting that motor imagery and mirror book therapy with conventional electrotherapy showed significant improvement in facial symmetry. The motor imagery technique encourages the patient to imagine the normal

movement before executing it. Motor imagery needs the aware activation of brain regions concerned with movement preparation and execution, accompanied by voluntary inhibition [19]. The patients perceived the improvement in the movements over the visual feedback; they were viewing the reflection of the intact face instead of the facial palsy sensory feedback. This allowed the patient to perceive that the facial movements are occurring symmetrically. In mirror book therapy, seeing the unaffected face perform the exercises normally for the affected side will lead to increased activity of motor command pathways from the unaffected region, which is utilized to supplement the damaged region. As per the literature, with the use of Mirror book therapy, the patients can visually appreciate the return of muscle activity [16].

Table 2 compares the mean value for the FDI score of patients. The mean value of the FDI score for pre-intervention was 79.3±12.01, and the mean value of post-intervention was 155.8±21.87. As results showed, the patients

had a significant increase in FDIS scores compared to the SFGS and FDI scores. The FDIS is a subjective measure of a patient's social rehabilitation. It measures whether or not a patient feels "calm," "peaceful," and other more psychosocial goals, such as whether one feels comfortable going outside in public [17]. The mirror book therapy was more beneficial for psychological reinforcement in the psychosocial domain. The intervention involves repeatedly seeing oneself with a normal face through the mirror for the patients. ¹⁶ Motor Imagery is a cognitive process in which a subject imagines that he/she performs a movement without actually performing the movement and without even tensing the muscles. It is a dynamic state during which the representation of specific motor action is internally activated without any motor output [15,18]. The Motor Imagery and Mirror book therapy has improved facial symmetry and quality of life.

Patients showed slightly more improvement in the psychosocial domain of the FDI score. In motor imagery and mirror book therapy, the patient will not initiate excessive contraction of muscles on the affected side, which prevents synkinesis and dyskinesia. Both techniques had a positive impact on the patient's mind. That was less stressful, and the technique relieves the patient's psychological stress. In motor imagery and mirror book therapy, the patient feels the face is normal, calm, comfortable, confident, and peaceful. In mirror book therapy, patients can see the unaffected side face with bifold mirrors, so they feel that the whole face is normal. With motor imagery, the patients imagine their normal faces and different expression exercises of the face. Motor imagery is a potential tool to examine action representation because it can provide insights into action planning and perception processes. In mirror book therapy, the mirror neuron circuit activates the brain's interpretation of mirror reflex as an image corresponding to the paretic side, activating injured motor circuits [15-18].

So, the result suggested that the improvement was found in the SFGS score, which shows that facial symmetry improves in patients. A

significant improvement was found after intervention in the Motor Imagery and Mirror book therapy group in the FDIS domain of the FDI score.

CONCLUSION

The study concluded the effectiveness of motor imagery and mirror book therapy in improving facial function and symmetry in patients with acute Bell's palsy.

Conflicts of interest: None

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ABBREVIATIONS

FDI - Facial Disability Index

FDIP - Facial Disability Index Physical

FDIS - Facial Disability Index Social

HBS - House-Brackman score

MBT - Mirror Book Therapy

MI - Motor Imagery

SFGS - Sunnybrook Facial Grading System

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