PHYSICAL THERAPY
MANAGEMENT FOR
FACIAL NERVE PARALYSIS

Prepared by:
Committee of Physical Therapy Protocols
Office of Physical Therapy Affairs
Ministry of Health – Kuwait
2007

With collaboration of:
Physical Therapy Department
Kuwait University
ACKNOWLEDGEMENT

Our sincere thanks and gratitude to Ministry of Health for its continuous support and encouragement that extended to us.

And, I extend my sincere thanks to all committee members of the physical therapy protocol for their excellent work in preparation of this scientific material and to the physical therapy department in Kuwait University for their participation in this endeavor.

Lastly, I would like to dedicate this protocol to all colleagues with in the profession, medical team members, and who are interested in physical therapy profession, wishing that this booklet will be useful and helpful toward improving physical therapy services in Kuwait.

With best wishes….

Director of physical therapy affairs
NABEEL Y. ALHUNAIF, P.T., B.Sc.

Note: This protocol is a guideline only and it may vary from patient to patient.

Definition:
It is a neurological condition that results from a lesion of the 7th cranial nerve leading to an acute onset of weakness or total paralysis on the ipsilateral side of the face.

Causes:
1) Bell’s palsy*
2) Ramsey-Hunt syndrome**
3) Middle ear infection
4) Trauma
5) Tumors
6) Post acoustic neuromas surgery
7) During surgery injuries.

* Although idiopathic facial paralysis (Bell’s Palsy), is the most common cause of unilateral facial paralysis accounting for proximately 50% of the causes, it’s important for clinicians to consider all causes to avoid overlooking potentially life-threatening disease. 1,2,4

** A condition caused by herpes zoster of the geniculate ganglion of the brain or neuritis of the facial nerve and characterized by severe facial palsy and vesicular eruption in the pharynx, external ear canal, tongue, and occipital area. Deafness, tinnitus, and vertigo may be present.3
**Time of intervention:** As soon as the patient reaches physiotherapy department.

**Physical Therapy Assessment:**
- Assessment should be finished within the first 3 sessions. (Appendix A for assessment sheet and guidelines).
- Documentation can be done by photo- and/or video recordings for static and dynamic movement (eyes closed, blowing, smiling, etc.) can be included.

**Goals:**
1) To educate / reassure the patient about the condition.
2) To relief pain.
3) To establish the bases for re-education of muscle and nerve conduction.
4) To re-educate sensation if involved (sensory integration: touch, 2 point discrimination, temperature)
5) To facilitate / improve muscle contraction.
6) To facilitate / improve facial symmetry.
7) To prevent complications.

**Frequency of treatment:**
Frequency of treatment sessions differs according to the severity and prognosis of each patient. However, by using the House classification system for re-evaluating the patient, it’s suggested to have:

<table>
<thead>
<tr>
<th>Month</th>
<th>Session / Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>3 sessions per week</td>
</tr>
<tr>
<td>2nd</td>
<td>twice per week</td>
</tr>
<tr>
<td>3rd</td>
<td>once a week</td>
</tr>
</tbody>
</table>

Patient should then be referred to the physician for further evaluation if no progression is noticed. A period of 14 months is allowed for recovery.

**Management:**

**Patient Education and Reassurance:**
1) Explain the condition to the patient; its causes, incidence, prognosis and treatment.
2) Re-assure the patient, but be realistic (don’t give high expectations).
3) Advice the patient to take the prescribed medication from the physician, and to avoid therapy given by non professionals. Explain to the patient that taking medication and following the physical therapy program are enough.
4) If eyes are involved, the patient should do the following:
   a) Use eye drops (as the physician prescribed)
   b) Don’t expose yourself to direct sunlight, being too close to TV light, or strong room lighting
   c) Wear sun glasses to protect eyes
   d) Don’t exhaust eyes by reading for long time
   e) Avoid direct contact with air conditioners
5) Explain to the patient how the psychological state can affect the treatment, so avoid any emotional conflict and seek family or friend support to increase self awareness and self esteem.
6) Be aware of postural imbalance (especially for Ramsey-Hunt syndrome).
7) Follow the given home program.
Treatment options:

The options available for physical therapy management to achieve the mentioned goals are as follows.
A. Electrotherapy
B. Neuromuscular retraining
C. Manual massage
D. Kabat rehabilitation.

A) Electrotherapy: ⁶ (Appendix B)

According to reviewed studies about the effect of electrotherapy modalities used for treatment of facial nerve paralysis it was found that neither modalities had a superior effect; (electrotherapy modalities can be used as an adjunct therapy)

The electrotherapy modalities reviewed included: electrical stimulation (ES), electromyography biofeedback (EMG bio), ultrasound, laser, and short-wave diathermy (SWD).

a) Electrotherapy still lacking evidence due to inappropriate research methodology, small sample size, inadequate treatment parameter, inconsistent follow up
b) No evidence support electrical stimulation benefit for acute facial paralysis but it's effective for chronic condition
c) Biofeedback is more effective when muscle activity presents
d) No evidence supports the benefit of using continues mode of short wave diathermy, while pulse mode can facilitate healing process in acute condition
e) Lazar still has no study supporting to use it with acute or chronic condition
f) Ultrasound can be beneficial for acute conditions, but there is lack of statistical support since research still not investigating it's long effect
g) ES & EMG bio are efficient to be use with chronic condition, other studies consider ES as contraindicated due to its interruption of re-innervations ⁴,¹⁶

- Therapist has to use his/her clinical judgment and skills to determine the best modality to be used according to the clinical presentation of the condition
- Considering the Physiological effects of electrotherapy modalities & the stage of the disease can help in facial paralysis management
- Lesion recovery depend on type of lesion, age, nutritional & metabolic status of the patient

Effect of electrotherapy in relation to classification of lesion ⁶,⁷

1. Neuropraxia: nerve conduction is block temporary with preserve axon, it's response to electrical stimuli, and usually has a complete recovery
   - Ultrasound effective to reduce edema & provide normal healing environment (still no appropriate parameter recommended)
   - Studies prefer to delay use ES unless poor prognosis factors present, also galvanic current still not prove it's beneficial.
   - Pulsed SWD used to facilitate healing & reduce edema (no study review found, but according to physiological affect)
Lazar increases the energy of the inflammatory area, also consider as anti-inflammatory, recommended to use it for elderly with poor metabolic or nutrition

EMG bio is not effective due to absent of muscle contraction

2. **Axonotmesis**: axon is interrupted but with intact nerve sheath and axon regenerated 1mm/day, potential has a complete recovery
   - Research mention that using the ES for 3 h/day, can lead to change capillary density
   - EMG bio will be effective as voluntary movement present, help to prevent synkinesis
   - Ultrasound & heat have a poor efficiency, while Laser can be effective at this phase (Further studies need to prove relevance of modalities on healing process)

3. **Endoneurotmesis**: endoneurium & axon are destroy while perineurium is intact, axon regenerate with scar lead to partial re-innervation & synkinesis therefore incomplete recovery

4. **Perineurotmesis**: only epineurium is intact while other nerve tissues destroyed, lead to abnormal regeneration, synkinesis & incomplete recovery

5. **Neurotmesis**: complete nerve rupture with little or no regeneration & recovery option, can develop painful neuromas beside the nerve

   - ES & EMG bio may maintain muscle tone
   - ES is significant with nerve or muscle grafting, according to its physiological affect such as improving circulation

B) **Neuromuscular retraining**: 4, 7, 16

   - Neuromuscular retraining is applied using selective motor training to facilitate symmetrical movement and control undesired gross motor activity (synkinesis*).

   - Patient re-education is the most important aspect of the treatment process. EMG feedback and/or specific mirror exercises will provide a sensory feedback to promote learning.

   - When each muscle group is being assessed, the patient observes the action of these muscles in the mirror and instructed to perform small symmetrical specific movements on the sound side to identify the right response. Each patient presents with different functional disability, so there are no general list of exercises.

   - As patient identifies the specific area of dysfunction, patient can begin to perform exercise to improve facial movements' guided by the affected side so isolated muscle response is preserved and coordination improved. Repetitions & frequency of exercises can be modified according to improvement status (appendix C)

   - The movements should be initiated slowly and gradually so that the patient can observe the angle, strength, and speed of each movement, because rapid movements can't help the patient in controlling the abnormal movement (synkinesis).

   - The patient can apply a manual resistance as isolated facial movement improved in affected side to be obvious without synkinesis.
**Synkinesis:**

- The site of synkinesis should be identified in order to teach the patient how to control abnormal movement pattern.

- The treatment of synkinesis depends on inhibition of the unwanted movements that occur during volitional & spontaneous movements; by perform facial movement slowly without triggering the abnormal movement. Stretching is recommended here to prevent muscles tightness.

**C) Manual Massage:**

- Massage can be performed in conjunction with other treatment options. It can be done to improve perceptual awareness.

- Massage manipulations on the face include:
  1. Effleurage
  2. Finger or thumb kneading
  3. Wringing
  4. Hacking
  5. Tapping
  6. Stroking

---

* An involuntary movement of one part occurring simultaneously with reflex or voluntary movement of another part

---

**D) Kabat Rehabilitation**

- Kabat rehabilitation is type of motor control rehabilitation technique based on proprioceptive neuromuscular facilitation (PNF).

- During Kabat, therapist facilitate the voluntary contraction of the impaired muscle by applying a global stretching then resistance to the entire muscular section and motivate action by verbal input and manual contact. (table 1)

- When performing Kabat, **ice stimulation** has to perform to a specific muscular group, in order to increase its contractile power.
<table>
<thead>
<tr>
<th>Muscle</th>
<th>Stretch</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orbicularis Oculi</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
<tr>
<td>Levator Labii major</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
<tr>
<td>Zygomaticus Nares and Nasals</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
<tr>
<td>Procerus</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
<tr>
<td>Corrugator Supercelli</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
<tr>
<td>Frontalis</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
<tr>
<td>Mentalis</td>
<td>![Image of muscle action]</td>
<td>![Image of muscle action]</td>
</tr>
</tbody>
</table>
**Prognosis:**

- The majority of patients with facial nerve paralysis (about 85%) begin to recover within the *first 3 weeks* after onset.
- While about 15% of patients, recovery begins after 2 to 3 *months* from onset.
- Satisfactory recovery of facial paralysis was reported to achieve grade 1 or 2 on the *House-Brackmann Grading System*.
- Poor recovery is usually determined after 6 months of onset.
- Poor recovery notice for patients with history of diabetes, hypertension and obesity.

Table 2: Risk Factors that may lead to poor prognosis:

<table>
<thead>
<tr>
<th>High Risk Factors</th>
<th>NET* response</th>
<th>Moderate Risk Factors</th>
<th>Severity of facial paralysis</th>
<th>Age</th>
<th>Low Risk Factors</th>
<th>Cause of facial paralysis</th>
<th>Stapedial reflex***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery after a month of onset</td>
<td>79% of Patients who exhibit grade 4 and above after 1 month will have poor prognosis than patients with grade 3 or less.</td>
<td>47% of Patients with severe paralysis (grade 5 and above) had poor prognosis than patients with incomplete paralysis (grade 4 and below).</td>
<td>26% of patients above 50 years old had significant poor prognosis.</td>
<td>24% of patients with VZV** cause had significant poor prognosis than other causes.</td>
<td>If the stapedial muscle reflex is absent, only 20% will have poor prognosis.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Nerve excitability test, examined by ENT specialist
** varicella-zoster virus
*** examined by ENT specialist.

**Appendix (A)**

<table>
<thead>
<tr>
<th>MINISTRY OF HEALTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOSPITAL:</td>
</tr>
<tr>
<td>Physical Therapy Department</td>
</tr>
<tr>
<td>Facial Paralysis Assessment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient’s Name:</th>
<th>Telephone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>File No:</td>
<td>Gender: M F</td>
</tr>
<tr>
<td>Age:</td>
<td>Nationality:</td>
</tr>
<tr>
<td>Occupation:</td>
<td>Date of Referral:</td>
</tr>
<tr>
<td>Referring Physician:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ward:</th>
<th>Room:</th>
<th>Bed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRESENT HISTORY (D.O. Onset: ___________)**

---

**PAST MEDICAL HISTORY** (include number of years):

- Heart Disease
- Prior CVA / TIA
- DM Type:
- Cancer
- Hypertension
- Lung Disease
- Previous Episode
- Other:

Details:

**SOCIAL HISTORY**

**PSYCHOLOGICAL IMPACT**

- Anxious
- Depressed
- Concerned
- Other:

**MEDICATION**

- Analgesic
- Corticosteroids
- Antibiotic
- Antiviral

**PATIENT’S CONCERN**: ____________________________________________________________________

**OBSERVATION / ASSOCIATED CONDITIONS**

- Facial asymmetry
- Synkinesis
- Otorrhea
- Headache
- Blurred vision
- Drooling
- Otolgia
- Vertigo
- Lacrimation
- Taste disturbance
- Tinnitus
- Hearing impairment
- Bell’s phenomenon
- Parasthesis
- Other:

**PAIN** (location, description, intensity)

---

**SENSATION**

---

**FUNCTIONAL STATUS**
**FACIAL MUSCLE STRENGTH**

<table>
<thead>
<tr>
<th>Muscle Grade</th>
<th>Date</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontalis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrugator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orbi. oculi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procerus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dl. Nasalis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risorius</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zygomaticus major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orbi. oris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levator labii superioris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levator anguli oris</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Database for Facial Paralysis Assessment**

- **Present History:** progression of disease and date of onset
- **Receiving Traditional Treatment:** if yes, list the type of traditional treatment patient received
- **Past Medical History:** other relevant medical problems / conditions (CVA: cerebrovascular accident, TIA: transient ischemic attacks, DM: diabetic mellitus), previous episode and treatment
- **Social History:** marital status, living situation, occupation and hobbies
- **Psychological Impact:** patient emotional status e.g. anxious, depressed or concerned (worried) …etc.
- **Medication:** list of current medications, dose and times of day
- **Patient Concern:** what the patient wants to achieve
- **Observation / Associated Conditions:** description of observations of patient on 1st assessment and any associated problems or conditions e.g.:
  - Synkinesis: abnormal regeneration of the facial nerve resulting in a cross-wiring in the muscle motor end plates. e.g.: when the patient smiles, his eyelid closes on the affected side
  - Lacrimation: an outflow of tears, weeping
  - Otorrhea: discharge from the external auditory meatus
  - Otologia: pain in the ear
  - Tinnitus: a buzzing, thumping or ringing sound in the ear
  - Bell's phenomenon: rolling of the eyeball upward & outward when an attempt is made to close the eye on the side of the face affected in peripheral facial paralysis
- **Pain:** site (mastoid, facial nerve exit or cervical), type and grade of pain (use Visual Analogue Scale or Numerical Analogue Scale)
- **Sensation:** test light touch, temperature and any abnormal sensory feelings
- **Functional Status:** picture of present lifestyle, and limitation in self care activities e.g. feeding
- **Facial Muscle Strength:** muscle test as per Oxford grading (key illustrated)
### House-Brackmann Classification of Facial Function:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Degree</th>
<th>Description</th>
<th>At rest</th>
<th>At motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>Normal facial function in all nerve branches</td>
<td>Normal</td>
<td>Normal facial function in all nerve branches</td>
</tr>
<tr>
<td></td>
<td>Gross</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Slight</td>
<td>Slight weakness on close inspection, slight asymmetry</td>
<td>Normal tone &amp; symmetry</td>
<td>Forehead: good to moderate movement Eye: complete closure with minimum effort Mouth: slight asymmetry</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>Obvious but not disfiguring facial asymmetry. Synkinesis is noticeable but not severe. May have hemi-facial spasm or contracture</td>
<td>Normal tone &amp; symmetry</td>
<td>Forehead: slight to moderate movement Eye: complete closure with effort Mouth: slight weakness with maximum effort</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Moderately severe</td>
<td>Asymmetry is disfiguring &amp;/or obvious facial weakness</td>
<td>Normal tone &amp; symmetry</td>
<td>Forehead: no movement Eye: incomplete closure Mouth: asymmetrical with maximum effort</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Severe</td>
<td>Only slight, barely noticeable movement</td>
<td>Asymmetrical facial appearance</td>
<td>Forehead: no movement Eye: incomplete closure Mouth: slight movement</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Total paralysis</td>
<td>No facial function</td>
<td>No facial function</td>
<td>No facial function</td>
</tr>
</tbody>
</table>

**Precaution:** an action done to avoid possible danger, discomfort, … etc

**Problem List:** concise summary of main problems observed from assessment, which require intervention

**Treatment Goals:** specific, achievable, objective goals with time frame

**Treatment Plan:** specific outline of treatment plan, essential details of treatment procedures with specific treatment techniques

### Table 1. Summary of the studies using electrical stimulation in the treatment of Bell’s palsy

<table>
<thead>
<tr>
<th>Author</th>
<th>Number</th>
<th>Study</th>
<th>Follow-up</th>
<th>Treatment</th>
<th>Outcome measure</th>
<th>Key result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wein (1976)*</td>
<td>1</td>
<td>Case study of Bell’s palsy at 1 week</td>
<td>Not specified</td>
<td>M yo-motor stimulation; 40 min/day for 10 days</td>
<td>Subjective report</td>
<td>Treatment may have helped re-activate the affected nerve tissue</td>
</tr>
<tr>
<td>Finch et al. (1993)*</td>
<td>2</td>
<td>Case study of Bell’s palsy at 1 week</td>
<td>Not specified</td>
<td>Manipulation + high voltage therapy + exercise; Patient A, 5 sessions; Patient B, 9 sessions</td>
<td>Subjective report</td>
<td>Treatment successful</td>
</tr>
<tr>
<td>Shodde (1999)*</td>
<td>2</td>
<td>Case study of Bell’s palsy at 1 week</td>
<td>Not specified</td>
<td>Manipulation + high voltage therapy + exercise; Patient A, 5 sessions; Patient B, 9 sessions</td>
<td>Subjective report</td>
<td>Treatment successful</td>
</tr>
<tr>
<td>Patiello (1994)*</td>
<td>1</td>
<td>Case study of Bell’s palsy at 1 week</td>
<td>Not specified</td>
<td>Neurovascular stimulator + ice + stretching, daily for 30 min</td>
<td>Subjective report</td>
<td>Active return to some area for patient self-esteem and aesthetic appearance</td>
</tr>
</tbody>
</table>

### Table 2. Summary of the studies using short wave diathermy in the treatment of Bell’s palsy

<table>
<thead>
<tr>
<th>Author</th>
<th>Number</th>
<th>Study</th>
<th>Follow-up</th>
<th>Treatment</th>
<th>Outcome measure</th>
<th>Key result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iszio &amp; Zips (2001)*</td>
<td>40</td>
<td>Clinical trial: Bell’s palsy duration from 1 day to 6 months</td>
<td>Not indicated</td>
<td>Ultrasound; preauricular region</td>
<td>Subjective report</td>
<td>Treatment improved, 67% improved</td>
</tr>
</tbody>
</table>

---

**Precaution:** an action done to avoid possible danger, discomfort, … etc

**Problem List:** concise summary of main problems observed from assessment, which require intervention

**Treatment Goals:** specific, achievable, objective goals with time frame

**Treatment Plan:** specific outline of treatment plan, essential details of treatment procedures with specific treatment techniques
Table 3. Summary of the studies using EMG in the treatment of Bell's palsy

<table>
<thead>
<tr>
<th>Author</th>
<th>Number</th>
<th>Study</th>
<th>Follow-up</th>
<th>Treatment</th>
<th>Outcome measure</th>
<th>Key results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose et al. (1990)¹⁰</td>
<td>21</td>
<td>Prospective, randomised controlled trial of peripheral facial nerve surgery, Bell's palsy and acoustic neuroma.</td>
<td>N/A</td>
<td>EMG feedback versus no feedback combined with home rehabilitation. 2 sessions/week for 6 weeks, 1 session/week for 16 weeks.</td>
<td>Linear measurement of facial movement, visual assessment of voluntary movement, electrical measurement of facial nerve response to maximal stimulation at 8, 6, 12 months.</td>
<td>Significantly improved symmetry of voluntary movement and linear measurement of facial expression.</td>
</tr>
<tr>
<td>Segel et al. (1995)¹¹</td>
<td>21</td>
<td>Randomised controlled trial of Bell's palsy (n = 7), acoustic neuroma (n = 12), post-surgery (n = 5) or post-trauma (n = 2).</td>
<td>N4</td>
<td>Bedrest combined with neurovascular rehabilitation 5 times/week for 12 weeks, 1 session/week for 8 months.</td>
<td>Horse-Brackmann scale and symmetry-symmetry grade.</td>
<td>Significant improvement, Bell's palsy group moved faster.</td>
</tr>
<tr>
<td>Jankel 1998¹²</td>
<td>1</td>
<td>Case study of Bell's palsy at 15 years' duration.</td>
<td>N4</td>
<td>Bedrest, 30 min daily for 3 weeks.</td>
<td>Physical measurements, comparisons of EMG recordings.</td>
<td>EMG may be useful in assessing muscle control and normal facial characteristics.</td>
</tr>
<tr>
<td>Biedermann &amp; Flajia (1989)¹³</td>
<td>3</td>
<td>Case studies of Bell's palsy at 9 months (patient A) and 3 months (patient B).</td>
<td>Patient A: 10 months; Patient B: 2 months.</td>
<td>EMG feedback, behavioral control techniques, electrostimulation.</td>
<td>Patient questionnaire, Spiller-Songer evaluation scale, clinical impressions.</td>
<td>Treatment showed promise early to achieve recovery and reduce complications.</td>
</tr>
<tr>
<td>Brasch &amp; Van Swearingen 1999</td>
<td>1</td>
<td>Case study of Bell's palsy at 2 weeks' duration.</td>
<td>N4</td>
<td>Facial reeducation with relaxation techniques and biofeedback. 14 treatments over 3 months.</td>
<td>FGS</td>
<td>Biofeedback should be further researched as an adjunct to treatment.</td>
</tr>
</tbody>
</table>

Table 4. Summary of the studies using ultrasound in the treatment of Bell's palsy

<table>
<thead>
<tr>
<th>Author</th>
<th>Number</th>
<th>Study</th>
<th>Follow-up</th>
<th>Treatment</th>
<th>Outcome measure</th>
<th>Key results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talati et al. (1989)¹⁴</td>
<td>29</td>
<td>Clinical trial, Bell's palsy duration &lt; 5 days.</td>
<td>6 months</td>
<td>Ultrasound, 1 kHz, 6.5 W/cm² to affected region, 5 min sessions for 14 consecutive days.</td>
<td>Horse-Brackmann scale</td>
<td>72% obtained grade I in Horse-Brackmann scale.</td>
</tr>
</tbody>
</table>

Table 5. Summary of the studies using laser in the treatment of Bell's palsy

<table>
<thead>
<tr>
<th>Author</th>
<th>Number</th>
<th>Study</th>
<th>Follow-up</th>
<th>Treatment</th>
<th>Outcome measure</th>
<th>Key results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berens (1993)¹⁵</td>
<td>17</td>
<td>Retrospective, Bell's palsy duration 2-150 weeks.</td>
<td>Not stated</td>
<td>Laser (+ massage, vitamins and steroids). 904 nm diode GaAlAs or 632.8 helium/neon on various locations, 5 min/loc, repeated 4 times/week.</td>
<td>Subjective</td>
<td>Reported as an excellent complementary medium for recovery.</td>
</tr>
<tr>
<td>Ladahlardo (2001)¹⁶</td>
<td>4</td>
<td>Clinical case report, Bell's palsy duration from 23 weeks to 27 years.</td>
<td>Not stated</td>
<td>Laser: GaAs 780 nm, 50 mW continuous wave emission, spot size 3 mm and total dose of 20 Joulas/session distributed to the peripheral trajectory of the injured nerve in an X-point b-point contact mode. 24 sessions over 12 weeks.</td>
<td>Horse-Brackmann scale</td>
<td>Signs of functional and electrophysiological recovery in all patients.</td>
</tr>
</tbody>
</table>

Appendix (C)

<table>
<thead>
<tr>
<th>Category and Representative Signs and Symptoms</th>
<th>Treatment*</th>
<th>Repetitions</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td>AROM</td>
<td>Low (&lt;10)</td>
<td>High (3-4 times a day)</td>
</tr>
<tr>
<td>Drooped resting posture</td>
<td>AROM</td>
<td>Education of the recovery process</td>
<td></td>
</tr>
<tr>
<td>Barely initiates movement or very minimal movement</td>
<td>AROM</td>
<td>Moderate (1-2 times a day)</td>
<td></td>
</tr>
<tr>
<td>Masked functional problems</td>
<td>AROM</td>
<td>Moderate (1-2 times a day)</td>
<td></td>
</tr>
<tr>
<td>Facilitation</td>
<td>AROM</td>
<td>Moderate (1-2 times a day)</td>
<td></td>
</tr>
<tr>
<td>Minimal drop at rest</td>
<td>AROM</td>
<td>Moderate (1-2 times a day)</td>
<td></td>
</tr>
<tr>
<td>Mild to moderate facial muscle weakness</td>
<td>AROM</td>
<td>Moderate (1-2 times a day)</td>
<td></td>
</tr>
<tr>
<td>Movement control</td>
<td>Isolated movements</td>
<td>Quality, not quantity</td>
<td></td>
</tr>
<tr>
<td>Narrowed eye, deepened cheek,</td>
<td>Matched movements</td>
<td>High (3-4 times a day)</td>
<td></td>
</tr>
<tr>
<td>Mild to moderate facial muscle weakness</td>
<td>Controlled synkinesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synkinesis</td>
<td>Stretching</td>
<td>Low to moderate (&lt;10)</td>
<td></td>
</tr>
<tr>
<td>Relaxation</td>
<td>Stretching</td>
<td>As indicated by symptoms</td>
<td></td>
</tr>
<tr>
<td>Resting facial tension</td>
<td>Massage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facial twitches/spasms</td>
<td>Jacobson's relaxation exercises¹⁷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masked psychosocial difficulties</td>
<td>Rhythmic movement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References