Bell’s Palsy: To Treat or Not to Treat

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Historical Perspectives

- **Sir Charles Bell (1774-1842)**
  - Studied facial anatomy extensively during Battle of Waterloo
  - Concluded that facial nerve controlled facial expression
  - “Respiratory nerve of the Face”
Bell’s Palsy

- Idiopathic facial paralysis
- Diagnosis of Exclusion
- Most common diagnosis (> 60%) for acute facial palsy
- 30 per 100,000
- Peripheral neuropathy
- Generally unilateral
- Rapid onset < 48 hours
Age Distribution

Peitersen E. Am. J. Otology. 1982
Complete Remission & Age

Return of Muscular function

85 %

Time of beginning remission & Sequelae

Peitersen E. Am. J. Otology. 1982
Fig. 6. Distribution of time of complete recovery (cumulative) after the onset of paresis.
### Table VII. Distribution of patients with initial incomplete and complete paresis who make a full recovery from Bell’s palsy

<table>
<thead>
<tr>
<th>Paresis with full recovery</th>
<th>Initial</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Incomplete</td>
<td>512</td>
<td>30</td>
</tr>
<tr>
<td>Complete</td>
<td>1189</td>
<td>70</td>
</tr>
</tbody>
</table>
Symptomatology

- Reduced Stapedial reflex 71%
- Complete palsy @ presentation 69%
- Tear flow 67%
- Post-auricular pain 52%
- Dysgeusia 34%
- Hyperacusis 14%

Predicting Muscular Sequelae

<table>
<thead>
<tr>
<th>Function</th>
<th>Abnormal</th>
<th>Normal</th>
</tr>
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<tbody>
<tr>
<td>Taste</td>
<td>91</td>
<td>83</td>
</tr>
<tr>
<td>Stapedial</td>
<td>91</td>
<td>63</td>
</tr>
<tr>
<td>Lacrimation</td>
<td>27</td>
<td>5</td>
</tr>
</tbody>
</table>

Favorable prognosis for full recovery

- Incomplete palsy
- Early recovery
- Young patients
- Normal taste, stapedial reflex, lacrimation
- Lack of post-auricular pain

Pathophysiology

- Exact etiology unknown
- Viral infection
  - Herpes Simplex
- Vascular ischemia
- Autoimmune disorder
- Hereditary
### Role of HSV-1

<table>
<thead>
<tr>
<th>Condition</th>
<th>Patient Number</th>
<th>Age, Sex</th>
<th>Days after Onset</th>
<th>Serum Antibody TITER</th>
<th>HSV-1′′</th>
<th>VZV′′</th>
<th>EBV′′</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HSV-1 (CF)</td>
<td>VZV (CF)</td>
<td>EBNAβ</td>
<td>Primer Set 1</td>
</tr>
<tr>
<td>Bell palsy</td>
<td>1</td>
<td>23, M</td>
<td>31</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>46, M</td>
<td>15</td>
<td>8</td>
<td>8</td>
<td>40</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>44, M</td>
<td>23</td>
<td>4</td>
<td>&lt;4</td>
<td>40</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3, F</td>
<td>60</td>
<td>16</td>
<td>&lt;4</td>
<td>20</td>
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</tr>
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<td></td>
<td>5</td>
<td>35, F</td>
<td>24</td>
<td>8</td>
<td>4</td>
<td>&lt;10</td>
<td>+</td>
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<tr>
<td></td>
<td>6</td>
<td>55, F</td>
<td>31</td>
<td>8</td>
<td>4</td>
<td>NA</td>
<td>+</td>
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<tr>
<td></td>
<td>7</td>
<td>66, M</td>
<td>36</td>
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<tr>
<td></td>
<td>8</td>
<td>59, F</td>
<td>34</td>
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<td></td>
<td>9</td>
<td>9, F</td>
<td>37</td>
<td>32</td>
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<td>40</td>
<td>+</td>
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<tr>
<td></td>
<td>10</td>
<td>23, M</td>
<td>29</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>8, F</td>
<td>45</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporal bone</td>
<td>1</td>
<td>54, M</td>
<td>21</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>-</td>
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<tr>
<td>fracture</td>
<td>2</td>
<td>57, F</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Bacterial infection</td>
<td>3</td>
<td>70, M</td>
<td>9</td>
<td>&lt;4</td>
<td>4</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>64, F</td>
<td>12</td>
<td>16</td>
<td>&lt;4</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>Parotid cancer</td>
<td>5</td>
<td>60, F</td>
<td>45</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>65, F</td>
<td>48</td>
<td>&lt;4</td>
<td>4</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td>Neurona</td>
<td>7</td>
<td>23, F</td>
<td>52</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td>Chronic otitis media</td>
<td>8</td>
<td>13, F</td>
<td>-</td>
<td>&lt;4</td>
<td>&lt;4</td>
<td>80</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>17, M</td>
<td>-</td>
<td>&lt;4</td>
<td>&lt;4</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>52, M</td>
<td>-</td>
<td>16</td>
<td>8</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>11, M</td>
<td>-</td>
<td>16</td>
<td>&lt;4</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>49, M</td>
<td>-</td>
<td>16</td>
<td>4</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note: CF = Complement Fixation, EBNAβ = Early B Nuclear Antigen.*
Diabetes Mellitus

• Bell’s patients with DM
  – 14 % (Korczyn AD ’71)
  – 21 % (Alford BR ’71)
  – 38 % (Yasuda K ’75)

• 66% demonstrate glucose intolerance
• Functional recovery poorer in diabetics
Pregnancy

- Incidence of Bell’s palsy 3-4 x higher
  (Hilsinger, Cohen et al.)
- Third trimester with highest risk
- Higher risk of complete palsy
- Lower chance of complete recovery
  (Gillman et al.)
- Preeclampsia 6 x prevalence in pregnant women with facial palsy
Differential Diagnosis

Acute facial palsy

- **Infection**
  - Herpes Zoster Oticus (Ramsey Hunt Syndrome)
  - Lyme disease
  - Acute Otitis media +/- mastoiditis

- **Congenital**
  - Treacher Collins syndrome
  - Mobius syndrome

- **Trauma**
  - Temporal Bone fracture
  - Barotrauma

- **Metabolic**
  - Diabetes
  - Hypothyroidism

- **Vascular**
  - Benign intracranial hypertension

- **Neoplasm**
  - Facial neuroma
  - Acoustic neuroma

- **Toxic**
  - Thalidoide

- **Iatrogenic**
## Early Grading System

### Description of Sequelae

<table>
<thead>
<tr>
<th>GRADE</th>
<th>Palsy</th>
<th>Contracture</th>
<th>Ass. Mov.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>I</td>
<td>SLIGHT</td>
<td>JUST VISIBLE</td>
<td>NO</td>
</tr>
<tr>
<td>II</td>
<td>MODERATE</td>
<td>CLEARLY VISIBLE</td>
<td>YES</td>
</tr>
<tr>
<td>III</td>
<td>SEVERE</td>
<td>DISFIGURING</td>
<td>YES</td>
</tr>
<tr>
<td>IV</td>
<td>COMPLETE</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

**Figure 7.** The combination of the three variables required for an accurate description of sequelae.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal</td>
<td>Normal facial function in all areas</td>
</tr>
</tbody>
</table>
| II    | Mild dysfunction | Gross: slight weakness noticeable on close inspection; may have very slight synkinesis  
At rest: normal symmetry and tone  
Motion: forehead–moderate to good function; eye–complete closure with minimum effort mouth–slight asymmetry |
| III   | Moderate dysfunction | Gross: obvious but not disfiguring difference between two sides; noticeable but not severe synkinesis; contracture, and/or hemifacial spasm  
At rest normal symmetry and tone  
Motion: Forehead–slight to moderate movement; Eye–complete closure with effort; Mouth–slightly weak with maximum effort |
| IV    | Moderately severe dysfunction | Gross: obvious weakness and/or disfiguring asymmetry  
At rest: normal symmetry and tone  
Motion: Forehead–none; Eye–incomplete closure; Mouth–asymmetric with maximum effort |
| V     | Severe dysfunction | Gross: only barely perceptible motion  
At rest: asymmetry  
Motion: Forehead–none; Eye–incomplete closure; Mouth–slight movement |
| VI    | Total paralysis | No movement |
Contrast Enhancement: Bell’s Palsy vs. Control

### Bell’s Palsy

<table>
<thead>
<tr>
<th>Enhancement</th>
<th>Distal intrameatal</th>
<th>Labyrinthine</th>
<th>Geniculate ganglion</th>
<th>Proximal tympanic</th>
<th>Distal tympanic</th>
<th>Mastoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell’s palsy</td>
<td>(n = 125)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definite</td>
<td>50</td>
<td>6</td>
<td>67</td>
<td>37</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Slight</td>
<td>34</td>
<td>48</td>
<td>23</td>
<td>50</td>
<td>49</td>
<td>36</td>
</tr>
<tr>
<td>Absent</td>
<td>41</td>
<td>71</td>
<td>35</td>
<td>38</td>
<td>55</td>
<td>59</td>
</tr>
</tbody>
</table>

### Control

<table>
<thead>
<tr>
<th>Enhancement</th>
<th>Distal intrameatal</th>
<th>Labyrinthine</th>
<th>Geniculate ganglion</th>
<th>Proximal tympanic</th>
<th>Distal tympanic</th>
<th>Mastoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definite</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Slight</td>
<td>0</td>
<td>0</td>
<td>112</td>
<td>82</td>
<td>60</td>
<td>81</td>
</tr>
<tr>
<td>Absent</td>
<td>600</td>
<td>600</td>
<td>469</td>
<td>518</td>
<td>540</td>
<td>516</td>
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</tbody>
</table>

Topognostic Test

- Lacrimal
  - Schirmer’s Test
- Stapedial reflex
- Taste
- Salivary flow
Electrical Test

- Nerve Excitation test (NET)
- Maximal Stimulation test (MST)
- Electroneurography (ENoG)
- Electromyography (EMG)
Sunderland classification of peripheral nerve injury

Neurapraxia

Axonotmesis

Neurotmesis
Electroneurography (ENoG)

- Transcutaneous stimulation (Evoked EMG)
- Compound muscle action potential (CMAP)
- Most useful in acute phase within 3 days – 3 weeks of palsy
- But no info on class of injury (axonotmesis vs. neurotmesis)
Time course of Degeneration

Figure 2. Time course and range of complete denervation in Bell’s palsy (n=7). Note that the velocity of denervation of Bell’s palsy takes an intermediate course between neurotmesis and axonotmesis.
Figure 3. Time course and maximum of denervation in Bell’s palsy. Thirty consecutive patients with maximal denervation of 80 to 100%.
Electromyography (EMG)

- Recording of voluntary muscle action potentials by needles electrodes
- Does not differentiate axonotmesis & neurotmesis
- More useful 2-3 weeks after onset of complete paralysis
- Perform EMG if ENoG > 95% degeneration
EMG Interpretation

• Active voluntary motor units (MU)
  – Intact motor axon

• Myogenic fibrillation potention & Absent voluntary MU
  – Complete nerve degeneration

• Fibrillation + MU
  – Partial degeneration

• Polyphasic MU
  – Regenerating nerve
Management of Bell’s Palsy

• Observation

• Medical Treatment
  – Steroid
  – Anti-viral agents

• Surgery
  – Decompression
  – Dynamic vs. static reanimation

• Facial Rehabilitation
Cochrane review on Efficacy of steroids

- 4 trials of 179 patients
- Trial 1: Cortisone vs. placebo
- Trial 2: Prednisone + vitamins vs. vitamins
- Trial 3: High dose prednisone vs. saline
- Trial 4: Methylprednisolone
- Primary endpoint: VII recovery @ 6 mos
- Conclusions: NO significant benefit for giving steroids to Bell’s palsy patients
Efficacy of Steroid treatment

- Prospective RCT
- 56 patients
- Arm I: Steroids
- Arm II: Placebo
- Success = HB I or II
- F/u @ 3 and 6 weeks
- No significant difference in response in the 2 groups

Steroids in Complete paralysis

- Meta-analysis of 3 prospective trials
  - 230 patients with HB VI
- Treatment within 7 days of onset
- Total prednisone dose ≥ 400 mg (405-425 mg)
- Complete Recovery: HB VI → I
  - Steroid group has 17% higher rate of CR than control (placebo/no treatment)

Steroid vs. Steroid + Acyclovir

• Double-blind RCT

• 99 Bell’s palsy patients
  – 53 treated with acyclovir- prednisone
  – 46 with placebo – prednisone
  – Prednisone dose 400 mg five times daily x 10 days

• Combined therapy is better in terms of:
  – Return of muscle motion
  – Prevention of partial nerve degeneration

Steroid vs. Steroid + Acyclovir

- Prospective RCT of 150 patients
- Prednisolone (20 tid x 5d, 10 tid x 3 d, 10 qD x 2 d)
- Prednisolone + Valacyclovir (500 bid x 5 d)
- No significant difference in recovery

### Timing of Medical Treatment

<table>
<thead>
<tr>
<th></th>
<th>Acyclovir and predonisolone</th>
<th>Predonisolone alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early administration ≤3 days after onset</td>
<td>100%*† (65/65)</td>
<td>91.3%* (116/127)</td>
</tr>
<tr>
<td>Late administration 4–7 days after onset</td>
<td>86.2%† (25/29)</td>
<td>87.3% (226/259)</td>
</tr>
<tr>
<td>Total</td>
<td>95.7%‡ (90/94)</td>
<td>88.6%‡ (342/386)</td>
</tr>
</tbody>
</table>

*†‡p < 0.05

Hato N. Otol & Neurotol: 24(6) 2003
Sample Treatment

- **Corticosteroids**
  - Prednisone 60 mg PO daily x 5 days, taper

- **Anti-viral**
  - Valacyclovir 1000 mg PO TID

- **Eye care**
  - Glasses/ Sunglasses/ avoid contact lens
  - Artificial tears, lacrilube
  - Taping
  - Gold weight to upper eyelid
  - Ophthalmologic consultation

Surgical Decompression

- Middle Fossa
- Transmastoid
- Translabyrinthine
- Retrolabyrinthine
- Retrosigmoid
Anatomy of Facial Canal

- Labyrinthine: 1.02 mm
- Tympanic: 1.53 mm
- Mastoid: 1.48 mm
- Meatal foramen: 0.68 mm

Controversy over Surgical Decompression

- **In favor of:**
  - Gantz BJ ’99
  - Sillman JS ’92
  - Huges GB ’88
  - Goin DW ’82
  - Fisch U ’81
  - Brackmann DE ’80
  - Giancarlo HR ’70

- **Against:**
  - Adour KK ’01
  - Aoyagi M ’88
  - May M ’84
  - Gacek RR ’81
  - McNeill R ’74
  - Adour KK ’71
  - Mechelse K ’71
### Results of Middle Fossa Approach

<table>
<thead>
<tr>
<th>Grade</th>
<th>Iowa</th>
<th>Michigan</th>
<th>Baylor</th>
<th>Total</th>
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<tbody>
<tr>
<td>I</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>II</td>
<td>7</td>
<td>2</td>
<td>6</td>
<td>15</td>
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<tr>
<td>III</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>IV</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
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</table>

Michigan Study: MCF vs. Steroids

## Early MCF

<table>
<thead>
<tr>
<th>H-B</th>
<th>Steroid Only (Nonsurgical Controls)</th>
<th>MCF &lt;14 days</th>
<th>MCF &gt;14 days (Surgical Controls)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>4</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>7</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IV</td>
<td>0</td>
<td>0</td>
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</table>

H-B = House-Brackmann grade.
Timing of Decompression

![Graph showing the relationship between House-Brackmann Grade and Day of Decompression Following Total Paralysis. The correlation coefficient (r) is 0.74 and p-value is 0.0001. The graph includes data points for different numbers of subjects (N = 1, N = 2, N = 3).]
Algorithm

**Acute Paresis**
- Day 0 - 14
  - Prednisone
  - Follow-up 5 days
- Day >14
  - Observation
  - Follow-up 6 months

**Paralysis**
- Follow-up 1 month
- ENoG
- Follow Paralysis Protocol

**Acute Paralysis**
- Day 0 - 3
  - Prednisone
  - Follow-up 3 days
- Day 3 - 14
  - ENoG
- Day >14
  - Follow-up 6 months

**Acute Paralysis**
- >90% Degeneration
  - Prednisone
  - Recommend MCF Decompression
- <90% Degeneration
  - Follow-up Dependent on ENoG
  - up to 14 days

*Prednisone = 80 mg qd x 7 days - taper*
Factors to consider for Surgical Decompression

- Age
- Comorbidities
- ENoG
  - Endpoint
  - Progression / velocity of degeneration
- Days from onset of paralysis
- Return of muscle function
Thank you