Amblyopia Management – Past, Present and Future

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Amblyopia

- Amblyopia is the most common cause of preventable visual loss in children and results from any aetiology that creates a disparity in the vision from each eye (most common causes being refractive, strabismic, deprivational).

- The aim of treatment is to allow normal neurological development of the amblyopic eye.
Amblyopia Management - Past

Treatment for amblyopia dates back to the 1500’s. Ambroise Pare 1564 and Georg Bastill used masks as a form of treatment initially for strabismus.
IF YOU CAN STILL READ THIS DRINK THREE MORE GLASSES
Amblyopia Management - Past

• Claude Worth (1903) - refractive correction / use of atropine
• Bangerter-Pleoptic Therapy (1940’s)
Amblyopia Management - Past

• Cambridge Vision Stimulator (1978)

• However occlusion remained the main form of amblyopia treatment and arguments concerning the efficacy of occlusion treatment started as early as the 20th century and still continue to this day.
Amblyopia Management - Present

- Estimated that out of 500,000 consultations in UK paediatric eye clinic and orthoptic departments 90% were related to amblyopia (M Clarke 2010)

- Amblyopia is one of the most common reasons for NHS outpatient treatment

- The PEDIG (Paediatric Eye Diseases Investigator Group) have played a huge role in the research of amblyopia management
Amblyopia Management - Present

- **Refractive Adaptation**
  MOTAS (Stewart et al 2004) and PEDIG

- **Occlusion**
  Debate as to the amount of occlusion.

- **Atropine**
  Often reserved for those not tolerating patching, should it be used as an initial form of treatment?
  - Combined optical penalisation & atropine
# Occlusion Therapy

<table>
<thead>
<tr>
<th>STUDY</th>
<th>METHOD</th>
<th>RESULTS</th>
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<tbody>
<tr>
<td><strong>ROTAS (Stewart et al 2004)</strong></td>
<td>6 hours vs. 12 hours occlusion</td>
<td>6 hours results in similar visual outcome as 12 hours</td>
</tr>
<tr>
<td>Randomised Occlusion Treatment for Amblyopia Study</td>
<td>80 children age 4-7 yrs-Occlusion dose monitor worn</td>
<td>Mean dose rates actually given: <strong>4.2hrs (6hr) 6.2 hrs (12hr)</strong></td>
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<tr>
<td><strong>MOTAS (Stewart et al 2004)</strong></td>
<td>6 hours daily occlusion to all, monitored by occlusion dose monitor</td>
<td>Best visual; acuity achieved within <strong>150-250 hrs</strong></td>
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<tr>
<td>Modelling Dose Response in Amblyopia – Toward a child specific treatment plan</td>
<td>72 participants, 3-8yrsAniso/Strab/Mixed amblyopia</td>
<td>Average improvement of <strong>0.1 logmar lines per 120 hours</strong></td>
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<tr>
<td><strong>PEDIG 2003</strong></td>
<td>2 hours vs. 6 hours occlusion 3-7 yrs</td>
<td><strong>2 hours as effective as 6 hours</strong></td>
</tr>
<tr>
<td>Moderate amblyopia 0.3-0.6 logmar</td>
<td></td>
<td>62% achieved at least 3 lines of improvement with either</td>
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### Occlusion Therapy Contd.

<table>
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<tr>
<th>PEDIG 2003</th>
<th>6 hours vs. full time occlusion (all but 1 hour per day). 3-7 yrs</th>
<th>6 hours as effective as full time 4.8 lines vs. 4.7 lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe amblyopia 0.7-1.3 Logmar</td>
<td>3-7 yrs</td>
<td></td>
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<tr>
<td>PEDIG 2008</td>
<td>2 hours occlusion, near vs. distance activities 3-7 yrs</td>
<td>No statistically significant difference</td>
</tr>
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<td>Severe amblyopia 0.7-1.3</td>
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<tr>
<td>PEDIG 2006</td>
<td>2 hours occlusion vs. optical correction alone</td>
<td>Occluding for 2 hours – 0.8 line improvement in VA after 5/52, compared with no improvement in spectacle group</td>
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<tr>
<td>Moderate and severe amblyopia</td>
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## Atropine Therapy

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<th>Study</th>
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<th>Results</th>
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<tr>
<td><strong>Repka et al 2004</strong></td>
<td>Daily vs. weekend atropine</td>
<td>Similar results in both</td>
</tr>
<tr>
<td>(moderate amblyopia)</td>
<td>3-7 years old</td>
<td></td>
</tr>
<tr>
<td><strong>Li and Shotton 2009</strong></td>
<td>Daily vs. weekend atropine</td>
<td>Equal improvements in both</td>
</tr>
<tr>
<td>(moderate amblyopia)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repka et al 2009</strong></td>
<td><strong>Trial 1</strong>: Weekend atropine with plano lens vs. weekend atropine</td>
<td>Atropine combined with plano lens did not effect outcome</td>
</tr>
<tr>
<td>Severe amblyopia (0.7-1.3)</td>
<td><strong>Trial 2</strong>: Weekend atropine vs. 2 hours daily patching in 7-12 years</td>
<td>Weekend atropine was effective</td>
</tr>
<tr>
<td></td>
<td>Event correction in 3-6 years</td>
<td>Atropine was not significantly more effective than patching</td>
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Amblyopia Management - Future

- MREH - Future study into the use of atropine
- Levodopa - PEDIG pilot study
Amblyopia Management - Future

- Compliance, Age, Weaning, Cessation

- **Factors affecting compliance**: involve parent in management decision, visual disability (poor starting VA, eccentric fixation), age (greater neural plasticity in younger).

- **PEDIG** atropine vs. occlusion, quality of life questionnaire.

- **Journal of Ophthalmic Practice 2014**, survey of orthoptists – informed choice between patch and atropine
  - 99% patching first line of treatment
  - 29/340 patch and atropine equally
Amblyopia Management - Future

- **PEDIG 2010** - randomised trial comparing bangter filter and daily patching for treatment of children with moderate amblyopia (0.3 - 0.6 logmar)
  - Age 3-10 years, 180 participants, reviewed at 6, 12, 18, 24 weeks

**Bangerter Filter**

**Positives**
- Able to change density to modulate degree of deprivation
- Better compliance/Lower burden

**Negatives**
- Patient may peep around
- May not uniformly degrade vision (as predicted by manufacturer)
- Requires the use of glasses for treatment
Amblyopia Management - Future

Binocular Treatment of Amblyopia

• I-BiT System

• Birch et al ‘Binocular iPad Treatment for Amblyopia in preschool children’

• Tailor et al ‘Trial of Balanced Binocular Viewing (BBV) of 3D movies to treat anisometropic amblyopia

• Simone et al ‘Binocular Treatment of Amblyopia reduces severity of suppression to improve Visual Acuity’.
Aim: To establish the most effective treatment to benefit patient care, improve and advance practice and service, to ensure the most effective treatment is being delivered
Thank you
References

- Ansons A.L. Amblyopia – an historical perspective. CE Optometry, 2002; 5(3):79-82
- Repka MX, Kraker RT, Beck RW; Paediatric Eye Disease Investigator Group. Treatment of severe amblyopia with weekend atropine: results from 2 randomised clinical trials. JAAPPOS 2009;139(3):258-63
References

- PEDIG (Paediatric Eye Disease Investigator group) Impact of patching and atropine treatment on the child and family in the Amblyopia Treatment study. Arch Ophthalmology 2003;121:1625-32
- Repka MX, Krakre RT, Beck RW et al; Paediatric Eye disease Investigator group. Treatment of severe amblyopia with weekend atropine: results from 2 randomised clinical trials. JAAPPOS 2009;13(3):258-263