Glaucoma- A Basic Overview

Glaucoma Patient Support Group
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Milton Keynes University Hospital NHS Foundation Trust
Dear Patron,

Thank you for attending our Glaucoma Support Group meeting today. We would sincerely value your feedback.

Please complete Section 1 BEFORE Presentations:

SECTION 1:

1) How many times have you been to this Patient Support Group Meeting before today? (please circle below)

- 0
- 1
- 2
- 3
- >3

2) Please indicate what best applies to you by putting a vertical mark on the line:

<table>
<thead>
<tr>
<th>How much do I know about:</th>
<th>Nothing ----------- &gt; Everything 100%</th>
<th>Your Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. My condition?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. The Treatment Options?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Using Eye Drops?</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>How positive do I feel about:</th>
<th>Negative ----------- &gt; Positive 100%</th>
<th>Your Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. My Condition?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. My Glaucoma Care at MK?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<<STOP HERE!>>

Please put aside and only complete the next sections AFTER the end of the presentations. >>
A Funny Story......
Overview

- Definitions
- Background Statistics
- Monitoring of Glaucoma
- Management & treatment
- Glaucoma and Driving
- Future Directions
- Glaucoma in perspective
What is Glaucoma?
Definitions

What is Glaucoma?
- Umbrella term for group of conditions resulting in progressive optic nerve damage and a characteristic pattern of corresponding visual field loss

2% of those >40 years old

‘Eye Pressure-sensitive’

No ‘cure’ yet

Progression slowed by reducing IOP from baseline / highest (by at least a third)
What is Ocular Hypertension?
Definitions

- ‘Normal’ Eye pressure 10 - 21 mmHg

- What is Ocular Hypertension (OHT)?
  - Higher than average IOP (>21mmHg) without any evidence for nerve damage or visual field loss

- Can convert to glaucoma (approx 10%)

- OHT Patients are often related to glaucoma patients

- Consider treating if IOP > 30mmHg
What is ‘Normal Tension’ glaucoma?
Definitions – Normal Tension Glaucoma

- ‘Normal’ Eye pressure (10 - 21 mmHg)
- NTG - Normal eye pressure but still getting progressive glaucoma
- Thought to be related to poor circulation or poor blood supply to optic nerve
- Association with migraine and low BP
- Still worth lowering eye pressure (reduces daily fluctuations)
Relative numbers of glaucoma and OHT

- Blue = Ocular hypertension
- Light brown = Normal tension glaucoma
- Brown = Primary open-angle glaucoma with both elevated intraocular pressure and damage
What is ‘Open angle’ and ‘Closed angle’ glaucoma?
Open Versus Closed angle
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Why can glaucoma be missed?

- Usually no symptoms – central vision usually last to go
- Binocular compensation
- Prevent Blindness America Survey 2002
  - 50% heard of glaucoma but unsure what it was
  - 30% Never heard of glaucoma
  - 20% knew related to eye pressure (most thought it would have symptoms, could be easily cured and did not lead to blindness)
Background statistics

- Second biggest cause of blindness worldwide
- Ageing Population
Global Ageing – Number of people > 60 years

Background statistics

- Second biggest cause of blindness worldwide
- Ageing Population
- Variation in access to care:
  - Europe: 1 ophthalmologist / 10,000 population
  - India: 1 ophthalmologist / 400,000 population
  - Africa: 1 ophthalmologist / 1 million population
- Rapidly Growing Population of MK
  - Grown by 43,000 since 2001
  - 20.2% growth compared to 8.9% for England
- 76% of UK people would rather lose limb than their eyesight (Fightforsight website)
MK Population projections

Population (1000's)

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (1000's)</th>
</tr>
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<tbody>
<tr>
<td>1974</td>
<td>50</td>
</tr>
<tr>
<td>1984</td>
<td>100</td>
</tr>
<tr>
<td>1994</td>
<td>150</td>
</tr>
<tr>
<td>2004</td>
<td>200</td>
</tr>
<tr>
<td>2014</td>
<td>250</td>
</tr>
<tr>
<td>2024</td>
<td>300</td>
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Monitoring of Glaucoma and OHT

1) Intraocular Pressure (IOP)
2) Optic Nerve Assessment ("Cupping")
3) Visual Fields
Monitoring of Glaucoma & OHT:
1. Intraocular Pressure (IOP)
Monitoring of Glaucoma & OHT:

1. Intraocular Pressure (IOP)

- “normal” range 10-21mmHg (Caucasian Europeans)
- Up to 4mmHg difference between eyes normal. Abnormal > 8mmHg
- IOP very dynamic and variable
  - Diurnal variation (Highest early morning, >10mmHg variation abnormal)
  - Eye movements
  - Breathing Patterns
  - Physical activity
  - Supine vs sitting up
  - Seasonal variations (higher Jan-Feb and lowest in May-Aug)
Figure The distribution of intraocular pressures for each two-month period. The symbol (●) represent the mean and the vertical lines, above and below the mean, represent one standard error of the mean. Decreases are significant (*p < 0.02; **p < 0.001) as compared to highest mean value in January and February.

Qureshi et al Korean J. Ophthalm 1996 10:29-33
Figure 1. A comparison of 24-hour patterns of IOPs in the aging and the young volunteers. Solid symbols represent a group of 50- to 69-year-old volunteers (n = 21). Intraocular pressure was measured by a pneumatonometer 30 minutes after the odd hours in both the sitting (○) and the supine (▲) positions during the light/wake period (7 AM-11 PM) and only in the supine position during the dark period (11 PM-7 AM). Error bars represent SEM. Previously published results from two separate groups of 18- to 25-year-old volunteers were included for comparison. In one group (n = 12), IOP was measured in the sitting position (○) during the light/wake period and in the other group (n = 21) in the supine position (▲). During the dark period, all measurements of IOP were performed with subjects supine. Participants started 24-hour experiments at different times evenly distributed in the light/wake period.
60 y.o Male. POAG. Latanoprost at 22.00. GAT 13 at baseline, 15 after 24 hrs

79 y.o Female. POAG. Alphagan 9 & 17.30. Latanoprost at 22.00. GAT 14 at baseline, 16 after 24 hrs

56 y.o Male. PXF. Latanoprost at 23.00. GAT 21 at baseline, 23 after 24 hrs

Change in therapy in 11/15 (73%) of patients.
Central Corneal Thickness (CCT)

(Influence on IOP measurement)
Corneal Thickness Measurement (Pachymetry)
Central Corneal Thickness (CCT)

- Independent risk factor for development of glaucoma
- Tendency to overestimation of IOP in thick corneas (>555um)
- Tendency to underestimation of IOP in thin corneas (<555um)

<table>
<thead>
<tr>
<th>CCT (microns)</th>
<th>IOP (mmHg)</th>
<th>Glaucoma Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;555 (thick)</td>
<td>&lt;21 (normal)</td>
<td>average</td>
</tr>
<tr>
<td>&gt;555 (thick)</td>
<td>&gt;24 (high)</td>
<td>+</td>
</tr>
<tr>
<td>&lt;555 (thin)</td>
<td>&lt;21 (normal)</td>
<td>++</td>
</tr>
<tr>
<td>&lt;555 (thin)</td>
<td>&gt;24 (high)</td>
<td>+++++</td>
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2) Optic Nerve Assessment ("Cupping")
3) Visual Fields
Monitoring of Glaucoma & OHT:
2. Optic Nerve assessment
Monitoring of Glaucoma & OHT:
2. Optic Nerve assessment
Monitoring of Glaucoma & OHT:
2. Optic Nerve assessment
Nerve Fibre layer defect on red free photograph
Monitoring of Glaucoma and OHT

1) Intraocular Pressure (IOP)
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Monitoring of Glaucoma & OHT:

3. Visual Fields

Normal Left Eye

Progressive glaucoma Left Eye
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  - Glaucoma in perspective
Management Overview

Observation

Drops
(usually one to start with)

More Drops / Combination drops

Laser
(SLT / Iridotomy)

Laser
(Cyclodiode)

Surgery
(Trabeculectomy / Tube)
Surgical treatments
Cataract Surgery

Known to lower eye pressure

Effect can last 3 years or more

Lens extraction for angle closure / narrow angles

Good first procedure before Trabeculectomy or Tube surgery
Trabeculectomy

Mitomycin-C
Releasable suture
Scleral flap
Aqueous Shunt Surgery
(Tube)
Laser Treatments

Yag Laser Iridotomy
For closed / narrow drainage angles
Usually both eyes
Clinic procedure
Laser Treatments

ALT
Argon Laser Trabeculoplasty

SLT
Selective laser Trabeculoplasty
Cyclodiode Laser Ciliary Body Photocoagulation
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- **Glaucoma and Driving**
- Future Directions
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Glaucoma and Driving

- Only need to inform DVLA if *both* eye fields affected
- Not up to me! DVLA decides
- Need horizontal $120^\circ$ with $20^\circ$ above and below the horizontal ("letter box")
- Esterman fields done with both eyes open
- Legal obligation of patient to inform DVLA
NAME: A.N. Other

STIMULUS III, WHITE, BCKND 31.5 ASB
BLIND SPOT CHECK SIZE OFF
FIXATION TARGET CENTRAL
STRATEGY SINGLE INTENSITY
STIMULUS INTENSITY 10 DB

ID 168823
BIRTHDATE 04-09-13
DATE 18-02-08
TIME 13:31:13
PUPIL DIAMETER 4.5 MM
VA 20/40

RX USED
DS
DCX

FIXATION LOSSES 0/0
FALSE POS ERRORS 2/9
FALSE NEG ERRORS 0/6

TEST TIME 06:41
HFA S/N 630-7837

POINTS SEEN: 76/120
POINTS MISSED: 44/120
ESTERMAN EFFICIENCY SCORE: 63
Driving & Glaucoma

Driving Videos
Overview

- Definitions
- Background Statistics
- Monitoring of Glaucoma
- Management & treatment
- Glaucoma and Driving

Future Directions

- Glaucoma in perspective
Possible future alternatives to drops

Slow release inserts
(Amorphex TODDD implant)

Slow release implants
(pSivida, SKS Ocula)

Drug releasing tear duct plugs
(Ocular Therapeutix)

Drug releasing contact lenses
(UCLA)
MIGS
(Minimally Invasive Glaucoma Surgery)
Xen Implant
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Glaucoma in perspective
## Estimated Number of People living with Glaucoma

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>Percentage change from 2015 to 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milton Keynes</td>
<td>2,360</td>
<td>2,550</td>
<td>2,730</td>
<td>2,890</td>
<td>22%</td>
</tr>
<tr>
<td>SOUTH EAST</td>
<td>84,120</td>
<td>88,400</td>
<td>92,750</td>
<td>96,500</td>
<td>15%</td>
</tr>
<tr>
<td>ENGLAND</td>
<td>504,650</td>
<td>528,960</td>
<td>554,110</td>
<td>572,860</td>
<td>14%</td>
</tr>
</tbody>
</table>
Certification of Visual Impairment (CVI) rates

<table>
<thead>
<tr>
<th></th>
<th>Total number of CVIs (2013/14)</th>
<th>Rate of certification per 100,000 people (2013/14)</th>
<th>Percentage change in rate since 2012/13</th>
<th>Rate of age related macular degeneration CVIs per 100k people over 65 (2013/14)</th>
<th>Rate of glaucoma CVIs per 100k people over 40 (2013/14)</th>
<th>Rate of diabetic eye disease CVIs per 100k people over 12 (2013/14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milton Keynes</td>
<td>32</td>
<td>13</td>
<td>-6%</td>
<td>32</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>SOUTH EAST</td>
<td>3,615</td>
<td>41</td>
<td>-1%</td>
<td>123</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>ENGLAND</td>
<td>21,910</td>
<td>43</td>
<td>1%</td>
<td>119</td>
<td>13</td>
<td>3</td>
</tr>
</tbody>
</table>
Perspective

- **Glaucoma pick up and management much better in developed world**
- **Compliance with drops and keeping appointments reduces risk of disease progression**
- **Rate of absolute blindness from glaucoma thankfully relatively small**
- ** Majority of patients will not lose significant vision in their lifetime**
Summary

- Definitions
- Background Statistics
- Monitoring of Glaucoma
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Despite all our efforts…..Videos of the real world!
Thank you all for coming today.