Survey: Aim

- Estimate prevalence of
  - POAG
  - PACG
- Estimate (If possible ------)
  - Progression of occludable angles (PACS) to Angle closure (PAC) and Glaucoma

Study population 1995

- Vellore population 300,000
- 20 clusters from all census wards
- ICMR study on coronary heart disease
- 12 clusters selected for VES
Vellore Eye Survey 1995

- Vellore population 300,000
- 12 clusters
- study population 5697
- 30-60 age group
- 1932 subjects

Vellore Eye Survey

- History
- Complete eye examination
  - Hospital
  - Slit lamp
  - Applanation IOP
  - Gonioscopy

Complete Eye Examination

- Dilatation
- Fundus (indirect ophthalmoscopy)
- Slit lamp (exclude PXE etc)
- Disc : Stereoscopic Examination
  - glaucomatous features
  - cup : disc ratio > 0.7
  - cup:disc asymmetry ≥ 0.2
  - No photographs
Automated Perimetry

- HFA 30-2
  - Suspicious Discs & / or
  - “Raised” IOP
  - Not for “normals”

Diagnosis: Ocular Hypertension

- Elevated IOP (> 21 mm Hg)
- No field defects
- Open angle on Gonioscopy

Diagnosis: POAG

- Disc criteria & / or IOP > 21
- Field defect
  - Two of Anderson’s criteria
- Open angle on Gonioscopy
- No secondary causes for the above findings
PACG: Diagnosis

• Acute:
  • Painful red eye, raised IOP, blurred vision, vertically oval pupil, closed angles on gonioscopy, no secondary causes

• Chronic
  • SYNECHIAL
  • APPOSITIONAL

Diagnosis: Chronic ACG

• Synechial
  • Occludable angles on gonioscopy with
  • Typical PAS, with or without
  • Increased IOP, disc or field changes

• Appositional
  • Occludable angles on gonioscopy with
  • Increased IOP
  • No PAS
  • With or without disc or field changes

Results: Response Rate

• Target 1932 in the 30-60 age group
• 1521 could be contacted
• 972 subjects responded
• 50.3% of eligible
• (63.9% of those contacted)
Visual Fields: HFA

• Based on clinical examination
  • Disc & or IOP criteria
• Appointments given: 169
• Fields done: 82 (48.5%)

FINAL DIAGNOSIS

• POAG: 04
  • 08 if we account for fields not done
• PACG: 42
  • Synchial 33
  • Appositional 09
• OHT: 30

Prevalence (95% CI)

• POAG 4.1/1000 (0.08 - 8.1)
  • 8/1000 if we extrapolate for missed fields
• PACG 43.2/1000 (30.14 - 56.3)
• OHT 30.8/1000 (19.8 - 41.9)

972 people examined
Limitations

- Inexperience
- Small sample
- > 60 age group not included
- 50 % response (63.9 % of contacted)
- Fields obtained in only 50 % of indicated
- PAC and PACG both defined as PACG

V E S 1995 : Re-classification

- PACS : 10.35%
- Chronic Angle Closure : 37 persons (3.8 %)
  - Synechial closure : 30 persons
  - Appositional closure : 07 persons
- Primary Angle Closure Glaucoma: 5 (0.5 %)
- POAG : 0.41 % (0.8)
  that was in 1995

2000 Survey

To Determine :

- Progression of Occludable Angles to Angle Closure
- Progression of Angle Closure to Angle Closure Glaucoma
VES: 2000

- Randomly selected 110 normals
- All persons with PACS
- All persons with PAC

History & Examination

- History with specific inquiries regarding H/O acute angle closure glaucoma
- Examination in the hospital
- Masked manner
- Ophthalmologist with two years experience in Glaucoma clinic

Examination

- Complete Ophthalmic examination
  - Slit lamp (Haag Streit 900)
  - Goldman Applanation tonometry
  - Stereoscopic disc examination using 60 D lens
Gonioscopy

- To maintain consistency:
  - Initial Goldmann two mirror
  - Sussmann Indentation for all
  - Same grading system

Ocular Biometry

- Axial length
- Anterior chamber depth
- Lens thickness

Tomey model AL 1000

Definitions

- Primary Angle Closure Suspect:
  - Filtering portion of TM visible < 180°
  - No PAS
  - Normal IOP (IOP ≤ 21 mm Hg)
  - Normal disc
  - No field defects
Definitions: PAC

- Primary (appositional) Angle Closure:
  - Gonioscopically PACS
  - Raised IOP (> 21mm Hg)
  - No PAS

- Primary (synechial) Angle Closure:
  - Gonioscopically PACS
  - PAS
  - ± raised IOP

Disc / Field changes NOT required for diagnosis

Definitions: PACG

- Primary Angle Closure
  - Appositional
  - Synechial
  AND
  - Damage to
  - Disc
  - Field defects

Disc / Field changes Mandatory for diagnosis

Criteria for Progression

- Disc progression
  - Field defect not necessary for diagnosis
  - New typical Glaucomatous disc changes
  - Progression of CDR > 0.2 between two visits

- Presence of visual field defect on HFA
  (2 Anderson’s criteria) & correlating with glaucomatous disc changes
  - Confirmed by repeat field
  - No photographs
Results: Normals

- 300 persons contacted
  - 75 changed residence
  - 23 not contactable
  - 90 did not respond
  - 01 refused examination
  - 10 expired
  - 01 hospitalized

- 110 persons examined

No significant difference between responders and non-responders

Results: Normals

- 1 developed chronic synechial angle closure
- 2 developed OHT
- 1 developed NTG
- 6 developed visually significant cataract

Results: PACS

- 118 persons
  - 82 contacted
  - 34 shifted residence
  - 02 expired
  - 03 refused
  - 29 did not respond

- 50 were re-examined

No significant difference between responders and non-responders
Results: PACS

- 38 bilateral PACS
- 12 unilateral PACS
  - 4 progressed to bilateral PACS

Results: PACS

- Progression to primary angle closure:
  - 11 (22%, 95% CI 9.80-34.2)
- Appositional closure: 4
- Synechial closure: 7

Results: Progression of PACS

- All bilateral PACS
- Bilateral progression in 5 of the PACS
- Unilateral progression in 6 of the PACS
Results: PACS in 2000

• Re-classified to open angle: 2

• "kappa" for PACS between the two phases of the study: 0.96

Results: PACS

• None developed disc and field changes *
• No blindness due to glaucoma *
• No patients with H/O of acute angle closure glaucoma *
• 3 developed visually significant cataracts

* Could be as high as 6%

Absolute and Relative Risk

• Progression (AR) in “normals”: 0.9%
• Progression (AR) in PACS: 22%
• Relative Risk: 22 / 0.9 = 24.4
Biometry: Normal vs PACS

<table>
<thead>
<tr>
<th></th>
<th>PACS (n = 50)</th>
<th>Normal (n = 110)</th>
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</thead>
<tbody>
<tr>
<td>Axial Length</td>
<td>22.23 (0.76)</td>
<td>22.5 (0.8)</td>
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<tr>
<td>AC Depth</td>
<td>2.76 (0.44)</td>
<td>3.2 (0.4)</td>
</tr>
<tr>
<td>Lens Thickness</td>
<td>4.48 (0.62)</td>
<td>4.2 (0.5)</td>
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PACS: Biometric Parameters

<table>
<thead>
<tr>
<th></th>
<th>Non progression</th>
<th>Progression</th>
<th>p-value</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>No</td>
</tr>
<tr>
<td>Axial length</td>
<td>22.23</td>
<td>0.88</td>
<td>39</td>
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<tr>
<td>AC depth</td>
<td>2.77</td>
<td>0.48</td>
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<tr>
<td>Lens thickness</td>
<td>4.42</td>
<td>0.68</td>
<td>39</td>
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</tbody>
</table>

No difference between groups

Results: Primary Angle Closure

- 37 persons
- 32 contacted
- 2 expired
- 2 shifted residence
- 1 refused examination
- 28 persons re-examined

No significant difference between responders and non-responders
Progression to glaucoma (Disc and Field)
- 8 (28.5%, 95% CI 12.3% - 44.6%)

Primary appositional angle closure glaucoma: 2
Primary synechial angle closure glaucoma: 6

Results: Primary Angle Closure
- Bilateral PAC: 7 of 14 progressed
- Relative risk: 7

One eye previously diagnosed as appositional closure reclassified PACS
- 4 of 7 appositional closure developed synechiae
Results: Primary Angle Closure

- No blindness due to glaucoma *
- No patients with H/O of acute angle closure glaucoma *
- One blind due to Retinitis Pigmentosa
- 3 persons developed visually significant cataracts

* Could be as high as 10 %

PACG: Biometric Parameters

<table>
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<tr>
<th></th>
<th>Non progression</th>
<th>Progression</th>
<th>Significance Level</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>No.</td>
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<tr>
<td>Axial length</td>
<td>22.13</td>
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<tr>
<td>AC depth</td>
<td>2.71</td>
<td>0.45</td>
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<tr>
<td>Lens thickness</td>
<td>4.69</td>
<td>0.61</td>
<td>20</td>
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</tbody>
</table>

No difference between groups

Summary: PACS

- 22 % may progress to closure
- No disc or field changes; no blindness
- Laser PI may not be warranted for all occludable angles
- Cataract surgery
- Special situations like repeated dilatation
**Summary: Primary Angle Closure**

- 28.5% progress to angle closure glaucoma
- (Laser PI is effective in early cases)
- No blindness due to glaucoma

**By Product: 5 year Progression to OHT**

- 110 normals
- 25 of 29 OHT re-examined
  - Corrected IOP (for CCT)
- Progression to POAG: based on typical optic disc changes with corresponding field defects on automated perimetry

**Progression OHT**

- 2 reclassified as normal (CCT)
- Progression to POAG
  - 17.4%; 95% CI: 1.95 - 32.75
- RR of progression for OHT
  - 19.1 (95% CI: 2.2 – 163.4)
- All who progressed: bilateral OHT
- All who progressed
  - IOP fluctuation > 8 mm Hg (Day DVT)
V E S

- Population based information
  - Prevalence 1995
  - Progression 2000
- Lots & Lots of Limitations
- W --- I ----- D----- E CI's

Jai Hind