Clinical evaluation of SQUINT

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<table>
<thead>
<tr>
<th></th>
<th>Heterophoria</th>
<th>Heterotropia</th>
<th>Intermittant</th>
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<tbody>
<tr>
<td></td>
<td>Near Distance</td>
<td>Near Distance</td>
<td>Near Distance</td>
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<tr>
<td>Esodeviation</td>
<td>E’ E</td>
<td>ET’ ET</td>
<td>E(T)’ E(T)</td>
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<td>Exodeviation</td>
<td>X’ X</td>
<td>XT’ XT</td>
<td>X(T)’ XT</td>
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<td>RT hyper</td>
<td>RH’ RH</td>
<td>RHT’ RHT</td>
<td>RH(T)’ RHT</td>
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<td>LT Hyper</td>
<td>LH’ LH</td>
<td>LHT’ LHT</td>
<td>LH(T)’ LHT</td>
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</table>
• Orthophoria..straight eyes

• Heterophoria..Latent squint. Fusional control is always present

• Intermittent tropia..Occational squint.Fusional control is not constantly
• **Heterotropia.**

  Constant squint. Fusional control absent

• **Esotropia.** Cornea deviated nasally
Exo..Cornea deviated temporally
Vertical deviations

• **Hyper..Cornea deviated upwards**

• **Hypo..Cornea deviated downwards**
• Incyclo..V.meridian of cornea turned nasally (Intortion)

• Excyclo.. ... turned temporally (Extortion)
Types of squint

Comitant: Deviation not change with direction of gaze or fixing eye

Incomitant: Deviation varies with direction of gaze or fixing eye

Paralytic or restrictive

Alternating

Monocular
congenital

acquired
Complaints

- Squinting
- Double vision
- Asthenopia
- Headache
- Unilateral DV
- Abnormal head posture
Child Exam

1. Alignment - Nystagmus?
2. Palpebral fissures for Epicanthus-Ptosis-size-slant
3. Head size - If you have a question, measure
4. Infant's Response to Surroundings
6. Pupil Size - Response
7. Anything else
Visual acuity

- Tests for infants…Up to 2 yrs (It is obvious that these are all objective tests)

1. Fixation preference test
2. Grating acuity test
3. Optokinetic nystagmus (OKN) test
4. Visual Evoked Potentials (VEP)
Fixation preference test

CSM method

- Central
- steady
- Maintained

Attractive object on TV monitors

Toys

Bunch of keys

Spot light
Grating acuity tests
1. Teller acuity cards
2. Forced preferential looking (PFL)

- 6/240 at birth
- 6/60 at 3mths
Contrast sensitivity
• Optokinetic nystagmus (OKN) test
  • Smallest stripe that produces nystagmus
  • 6/120 at Birth
  • 6/60 in 6mths child
**VEP**

- Records cortical potentials to visual stimuli
- 6/120…1 mth
- 6/6 at 6 mths
2-4yrs  Verbal children

- Matching tests
- Illeterate  E
- Pictures
- Symbols
- Numbers
- 6/9

Bust vision tests
4-6yrs

Conventional subjective tests

- Snellens
<table>
<thead>
<tr>
<th>METHOD</th>
<th>1mth</th>
<th>2mths</th>
<th>6mths</th>
<th>Age</th>
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<tbody>
<tr>
<td>OKN</td>
<td>6/120</td>
<td>6/60</td>
<td>6/36</td>
<td>20-30mths</td>
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<tr>
<td>Preferential</td>
<td>6/120</td>
<td>6/60</td>
<td>6/36</td>
<td>24-36mths</td>
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<tr>
<td>looking</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>VEP</td>
<td>6/120</td>
<td>6/60</td>
<td>6/6-6/12</td>
<td>6-12mths</td>
</tr>
</tbody>
</table>
A) Sheridan’s Ball test
B) Teller Acuity Cards,
C) BUST-D distance vision test,
D) Sheridan-Gardiner’s single symbol test,
E) LH vision tests,
F) HVT visual acuity line test.
Motor signs

Inspection of eyes

- P.F. Pseudoptosis
PF
• **Change of PF on moving RT & LT**
Jaw winking
Pseudo strabismus

- Epicanthal fold
- Wide nasal bridge
- Ectopia of macula
Cross fixation
• **Mongoloid** antimangoloid

Mongoloid

Level

Anti-mongoloid
Constant head posture (CHP)

Normal

Rt 6th

Head posture in right superior oblique palsy.
The chin is down and the head tilted left while the eyes look up to the right. This compensates for both the vertical and the torsional defect.

Rt.4th

face right, while the eyes assume levoversion
Brown right eye Face Up - Left

SR palsy or IR restriction one or both eyes chin up

IR palsy with limited depression one or both eyes Chin Down
Nystagmus
Ocular movements

- Uniocular …..Ductions
- Binocular…….Versions

.........vergences

Convergence
Divergence
Assessment of Eye movements

- Versions first
- Spinning or dolls head phen. Vestibular stimulated movements
- Ductions
Ocular movements

Recorded as Overaction
RIO Can grade
1+ to 4+

Recorded as Underaction
LIR Can grade
-1 to -4
IO SR underaction
LE 4th nerve palsy
RT 3rd N palsy
Normal values for ductions
Limbus test of motility .... Kestenbaum
10mm .. Adduction
Abduction
Depression
5-7mm. Elivation
Special motor tests

• Forced duction test
• Active forced generation test
• Three step test
• Prism adaptation test
**Forced Ductions**

After topical anesthesia full adduction
= No restriction or
can't forcibly complete adduction = restriction

**Generated Force**

Restrain the OS in abduction, then ask patient to look slowly to the right -
Feel pull = Generated force in muscle
Feel no or little pull = paretic MR muscle
3 step test

Right Hyper
- RSO
- RIR
- LIO
- LSR

Left Hyper
- RIO
- RSR
- LSO
- LIR

Right Gaze
- RSR
- RIR
- LIO
- LSO

Left Gaze
- LSR
- LIR
- RIO
- RSO

Right Shoulder
- RSO
- RSR
- LIO
- LIR

Left Shoulder
- RIO
- RIR
- LSO
- LSR
Tests for ocular alignment

- Cover tests
- Corneal light reflex tests
- Dissimal image tests
- Dissimalar target tests
Cover tests

- Cover uncover test
- Alternate cover test
- Phoria + tropia
- Simultaneous prism cover test
  Tropia only
Prerequisites

- Fixation must be adequate
- Fixation target stimulates acc.
- Must be done for distance & near
- In upgaze & downgaze
- Near & Distance
- With & without glasses
- Palm of hand or occluder for cover
- Indirect occlusion in infants
- Spielman transluscent occluder
Results of cover test

- Presence of deviation  Phoria or tropia
- Type of deviation  Eso or Exo
- Eccentric fixation
- Amblyopia
- Degree of alteration
- Pseudoptosis
- Latent nystagmus
- Measurement of deviation
- Primary  & sec. deviation
Cover uncover test

I. **Technique**
   A. fixates on a point
      1. Penlight snellen chart
      2. Interesting target (e.g. small toy)
   A. Cover one eye
   B. Observe movement of uncovered eye
   C. Cover other eye and repeat test
      • Phoria or tropia
      • Straight eyes before and after phoria
Cover uncover test

• (No eye movement is shown here)
• The occluder covers each eye in turn allowing binocular viewing in between occlusion.
• The uncovered eye is observed, if it makes a movement a ‘TROPIA has been revealed.
• Note any movement of eyes upon removal of the occluder.
Note recovery or presence of alternation
Alternate cover test

• (No eye movement is shown here)
• The occluder covers each eye directly after the other, not allowing binocular viewing to occur.
• The uncovered eye is observed, if it makes a movement to take up fixation a ‘PHORIA OR ‘TROPIA has been revealed.
• If no movement was seen on the unilateral test, but movement is noted on the alternating test, the patient has a phoria
• Note any movement of the eyes upon removal of the occluder, (recovery).
Esophoria

cover - uncover test
no manifest squint (tropia) is present as there is no movement of the non-covered eye upon placement of the occluder. i.e. The left eye doesn’t move when the right is covered and vice versa. Therefore both eyes must have been fixating correctly. There is however a slight movement of the eyes after the occluder has been removed from in front of the eyes. This is a movement out (abduction) to take up fixation. Therefore the eye must have assumed an adducted position
Heterophorias

The alternate cover test is shown opposite, this shows us the esophoria more clearly, with each eye abducting (moving outwards) when revealed. The eyes must therefore have assumed a convergent position when the occluder inhibited binocular viewing. It is important to note the direction and extent of movement. This could be classified as a moderate esophoria with good recovery.

The recovery is another aspect that needs to be assessed to ascertain degree of compensation.
LET CUT

• On initial introduction of the occluder the left eye makes an outward movement to fixate.
• When the occluder is removed the patient reverts to right fixation.
• When the occluder is placed over the left eye no movement of right eye is perceived.
• When the occluder is swung between the eyes the revealed eye makes an abducting movement.
• When the occluder is finally removed the left eye remains in a convergent position.
RXT

• Cover - Uncover test
• The right eye makes an inward movement when the left eye is covered.
• There is no movement of the left eye when the right eye is covered.
• When the occluder is moved from the left eye, the eyes make a movement to allow left fixation.
Alternate Cover test

• Both eyes make an adducting movement when the occluder is moved between the eyes.
• When the occluder is removed the eyes revert to fixating with the left eye.
Right HYPERphoria
Left HYPERtropia
Motor Fusion
Measurement of deviation

- **Objective**
  - PBCT    KPBCT
  - Synaptophore
  - Corneal reflex test.. Hirschberg

- **Subjective**
  - Diplopia tests ;;;;Maddox cross    M. Wing
  - Haploscopic test

- In degrees
- In prism diopters
Limitations

Not suitable non fixing eyes
Eccentric fixing eye
Combination of prisms
Glass prism..prentice position
Plastic prism..frontal plane
Optical qualities of prisms
3-4D
Latent nystagmus

PBCT

- Alt.cover test with prisms
- Rotary ,bars,loose prisms
- Maximum dissociation
- Acc. target Not light source D..6/9 N .N6 or picture
- Phoria and Tropia
- Near & Distance
- Up & Down gaze
- Patch test in exo
- With & without glasses
Objective tests

- Prism bar cover test
Measurement in up & down gaze
Y Exo
krimsky  Prism bar test
Synaptophore

IPD
Detect & measure deviation
SMP
Fusion
Stereopsis
Fusional exercises
Macular function test
After image test
Corneal reflex test. Hirschberg

- Crude method
- Deviated eye is blind
- 1mm decenteration...7 degrees
- KPBCT
- Bruckner test
Dissimilar image test

- Maddox rod test
- Double maddox rod test
- Maddox wing
- Red filter test
Convergence

8-10cm or less
AC/A ratio

- Hetrophoria method
- Gradiant method
- 3-5d
Fusional vergence

• Convergence  $40^\circ$ Near  $15^\circ$ Dist

• Divergence  $12^\circ$ Near  $6^\circ$ Dist

• Vertical  Supra/Infra  $2-3^\circ$  ($6^\circ$ Total)

• Torsional  Incyclo/Excyclo  $2-3^o$  ($6^o$ Total)
Eccentric fixation

- Visuoscropy
- Haidinger’s Brushes
- Foveal after image transfer
- Scanning laser ophthalmoscopy
- Maxwell's Spot
Lees test
Paretic RLR

The larger field is the field made with the right eye fixating--

OD is the paretic eye.

[Diagram showing visual fields for right and left eye fixation]
RLR Palsy
LLR palsy
RSO palsy
Sensory tests

- SMP
Fusion tests

- Worth four dot test
- Begolini glasses
- Synaptophore
Bagolini
Bagolini
SYNAPTOPHORE SLIDES
Tests for stereopsis

• Synaptophore
• Stereograms
• Titmus stereo test
• Random dot stereograms
• TNO test
• Lang test
• Two pencil test
Random dot Stereograms

At least one area is identical in the two stimuli. All other areas are random, so only one part of the visual field provides binocular stimulation, and depth.
Random dot
Contour stereo test

Titmusfly stereo test

- **Local stereopsis**
- Fly  3600 sec. of arc
- Animals  100-400
- Rings  40 - 800
Random dot stereo test

- Julesz
- Global stereopsis
- Butterfly test
- Fly 1200-2500
Randot

- Different geometric forms seen
- No monocular clues
- 250-500 seconds of arc
• Randot E test
• For young children
• Randot for preschool children
• 80-400
• Randot stereo smile test for infants 6mths
• **The Two Pencil Test of Lang**