

**National Healthcare Group (NHG) International Ophthalmology
Congress**

Singapore


15 – 17 Oktober 2009

**Prof. Madya Dr. Wan Hazabbah Wan Hitam
Jabatan Oftalmologi
Pusat Pengajian Sains Perubatan**



Singapore | 15 – 17 October 2009

Tan Tock Seng Hospital | Suntec Singapore International Convention & Exhibition Centre

Guest Faculty	Hotel	Flight Details	Talk schedule
 <p data-bbox="177 983 311 1059">A/Prof WAN HAZABBAH Malaysia</p>	Conrad	<p data-bbox="576 719 671 748">Arrival</p> <p data-bbox="576 752 847 784">Date : 14/10/09</p> <p data-bbox="576 788 735 817">Time : -</p> <p data-bbox="576 822 791 853">Flight No : N.A.</p> <p data-bbox="576 891 719 920">Departure</p> <p data-bbox="576 925 847 956">Date : 18/10/09</p> <p data-bbox="576 960 735 990">Time : -</p> <p data-bbox="576 994 791 1025">Flight No : N.A.</p> <p data-bbox="608 1064 906 1095">Guest drives to S'pore</p>	<p data-bbox="963 719 1182 748">1) Date: 15/10/09</p> <p data-bbox="995 752 1214 781">Time: 1755-1810</p> <p data-bbox="963 786 1326 815"><i>(Symposium IA : Approach To Diplopia)</i></p> <hr data-bbox="1054 831 1326 837"/> <p data-bbox="963 875 1182 904">2) Date: 16/10/09</p> <p data-bbox="995 909 1214 938">Time: 1930-2200</p> <p data-bbox="963 943 1134 972"><i>(Congress Dinner)</i></p>
<p data-bbox="134 1133 1425 1211">Associate Professor Wan Hazabbah Wan Hitam is the Head and Senior Lecturer at the Department of Ophthalmology, School of Medical Sciences, Health Campus Universiti Sains Malaysia (USM), Kelantan, Malaysia. He is also the Chief of the Neuro-ophthalmology division at the same centre.</p> <p data-bbox="134 1234 1425 1312">His main research interests include optic neuritis, the visual pathway and ocular myasthenia gravis. He is the 17th recipient of, and the first Malaysian to be awarded, the Tsutsui Grant Award in 2008, organised by the Japanese Neuro-ophthalmology Association (JANOS).</p> <p data-bbox="134 1335 1425 1391">He is currently the chairperson of the Malaysian Universities Conjoint Committee in Ophthalmology (MUCCO) and is also the president of the USM Doctors' Alumni Association (PADU).</p>			



**SCIENTIFIC PROGRAMME
DAY ONE**

Day One - 15 October 2009, Thursday
Theatrette, Tan Tock Seng Hospital
Time: 8.00am - 6.55pm

0800 - 0830

Registration

NEURO-OPHTHALMOLOGY NYSTAGMUS WORKSHOP

Chairperson: A/Prof Kong Yong GOH

0830 - 1030

Nystagmus And Ocular Oscillations - All That You Need To Know

Prof Michael HALMAGYI

- Peripheral Vestibular Nystagmus
- Optokinetic Nystagmus
- Pathophysiology Of Vestibular-Optokinetic Nystagmus
- Central Vestibular Nystagmus
- Saccadic Oscillations
- Gaze-Evoked Nystagmus, Rebound, Centripetal, Bruns' Nystagmus
- Acquired Pendular Nystagmus
- Nystagmus With Visual Loss
- Congenital And Infantile Types Of Nystagmus

1030 - 1100

TEA-BREAK

NHG EYE INSTITUTE - ZEISS GLAUCOMA DIAGNOSTIC WORKSHOP

Chairperson: Dr Hon Tym WONG

1100 - 1120

Using And Interpreting SITA SWAP And FDT

Prof Chris JOHNSON

1120 - 1140

The Cirrus OCT For Glaucoma Diagnosis And Progression Analysis

A/Prof Christopher LEUNG

1140 - 1200

How To Use The New Glaucoma Progression Analysis To Determine Visual Field Progression

Prof Chris JOHNSON

1200 - 1220

The GDx Enhanced Corneal Compensation

A/Prof Christopher LEUNG

1220 - 1240

Anterior Segment Imaging For Glaucoma

A/Prof Tin AUNG

1240 - 1300

Question & Answer

1300 - 1315

LUNCH

FREE PAPER SESSION

1345 - 1355

Welcome And Opening Address

A/Prof Kong Yong GOH

1355 - 1400

Introduction To The Victor Yong Lecture

A/Prof Tock Han LIM

1400 - 1430

5th Victor Yong Lecture

Reducing Blindness From Primary Angle Closure Glaucoma

A/Prof Tin AUNG

FREE PAPER SESSION I: JUNIOR CATEGORY

NHG Eye Institute - Allergan Research Prize

Basic Specialist Trainees, Senior House Officers And Junior Residents

Chief Judge: Dr Vernon YONG

Judges: Prof Michael HALMAGYI, A/Prof Tin AUNG

1430 - 1437

Transplantation Of A Bioengineered Oral Epithelial Equivalent For The Treatment Of Contracted Sockets And Forniceal Shortening

Dr Leslie Jonathan Pek Seng ANG

1437 - 1444

Comparison Of Influence Of Cataract And Small Pupil On Retinal Nerve Fiber Layer Thickness Measurements Between Time Domain And Spectral Domain Optical Coherence Tomography

Dr Clarissa SM CHENG

1444 - 1451

Elevated MCP-1 In Tears Is An Indicator Of Early Post-Operative Scarring Following Trabeculectomy

Dr Rachel Shujuan CHONG

1451 - 1458

Correlating Pre-Operative Biometry And Post-Operative HVF Changes With Phaco-Trabeculectomy Outcomes - A Retrospective Analysis Of Primary Angle Closure And Primary Open Angle Glaucoma Patients In An Asian Population

Dr Nicola Yi'an GAN

1458 - 1505

Living With Uveitis - How Much Does It Affect Our Patients?

Dr Petrina TAN



SCIENTIFIC PROGRAMME DAY TWO

Day Two - 16 October 2009, Friday
Theatre, Suntec Singapore International Convention & Exhibition Centre
Time: 8.00am - 5.30pm

0800 - 0830

Registration

FREE PAPER SESSION III: SENIOR CATEGORY NHG Eye Institute - Alcon Research Prize Consultant Ophthalmologists, Ophthalmology Lecturers And Above

Chief Judge: Dr Hon Tym WONG

Judges: Prof Randy KARDON, A/Prof Christopher LEUNG

0835 - 0842

The Novel Use Of A Human Cord Blood Serum-Supplemented Culture Medium For The Ex Vivo Expansion Of Conjunctival And Limbal Epithelial Cells

A/Prof Leonard Pek Kiang ANG

0842 - 0849

The Effect Of Coenzyme Q10 And Curcumin On Chronic Methanol Intoxication Induced Retinopathy In Rat

A/Prof Nipon CHIRAPAPAIAN

0849 - 0856

Optical Coherence Tomography To Measure Retinal Nerve Fiber Thickness In Normal Children Of North Indian Population

Dr Monica GANDHI

0856 - 0903

Glaucoma Blindness Is A Disease Of Poverty And Ignorance In India

Dr Parikshit GOGATE

0903 - 0910

Residual Neurovascular Function And Retinotopic Organisation In A Case Of Hemianopia After Visual Restoration Therapy

A/Prof Kong Yong GOH

0910 - 0917

Change In Optic Nerve Morphology Following Reduction In Intraocular Pressure - An SD-OCT Study

Dr Daniel Hsien Wen SU

0917 - 0924

Classification Of The Vascular Patterns Of Polypoidal Choroidal Vasculopathy And Its Relation To Clinical Outcomes

Dr Colin Siang Hui TAN

0924 - 0931

Judges' Comments

BEST JUNIOR CATEGORY PRESENTATIONS

0931 - 0938

Best Oral Presentation

0938 - 0945

Merit Oral Presentation

BEST INTERMEDIATE CATEGORY PRESENTATIONS

0945 - 0952

Best Oral Presentation

0952 - 0959

Merit Oral Presentation

0959 - 1015

TEA-BREAK

NHG 8th ANNUAL SCIENTIFIC CONGRESS OPENING CEREMONY

NHG EYE INSTITUTE - ALCON LUNCH SYMPOSIUM

Advances In The Treatment Of Glaucoma

Chairperson: Dr Hon Tym WONG

1215 - 1230

What's New In Fixed Combination Therapy

Dr Paul HEALEY

1230 - 1245

Clinical Experience With Fixed Combination Therapy

Dr Seng Kheong FANG

1245 - 1300

What's Exciting In Glaucoma Surgery

A/Prof Tin AUNG

1300 - 1315

Question & Answer

END OF ALCON LUNCH SYMPOSIUM



SCIENTIFIC PROGRAMME DAY ONE

Day One - 15 October 2009, Thursday
Theatrette, Tan Tock Seng Hospital
Time: 8.00am - 6.55pm

1505 - 1512	Postoperative Complications After Phacotrabeculectomy For Subjects With Primary Angle Closure Glaucoma Compared To Primary Open Angle Glaucoma	<i>Dr Yar Li TAN</i>
1512 - 1519	Routine Bone Marrow Biopsy (BMB) May Not Be Necessary For Patients With Radiologically Early Stage Orbital Mucosal Associated Lymphoid Tissue (MALT) Lymphoma	<i>Dr Shaan WIRYASAPUTRA</i>
1519 - 1526	Correlation Between Optical Coherence Tomographic Features And Clinical Outcomes In Diabetic Macular Oedema	<i>Dr Francine Peilin YANG</i>
1526 - 1533	Judges' Comments	

1533 - 1550

TEA BREAK

FREE PAPER SESSION II: INTERMEDIATE CATEGORY **NHG Eye Institute - Bausch & Lomb Research Prize**

Clinical Fellows, Advanced Specialist Trainees, Registrars And Senior Residents

Chief Judge: A/Prof Kong Yong GOH

Judges: Dr David GARWAY-HEATH, Dr Seng Kheong FANG

1550 - 1557	Prognostic Factors For Open Globe Injuries - Analysis of 669 Eyes in a Five Year Study	<i>Dr Rupesh AGRAWAL</i>
1557 - 1604	Evaluation Of Scanning Protocols For Imaging Of The Anterior Chamber Angle With Anterior Segment Optical Coherence Tomography	<i>Dr Wei Boon KHOR</i>
1604 - 1611	Post-Operative Complications After Trabeculectomy Surgery For Primary Angle Closure And Primary Open Angle Glaucoma	<i>Dr Marcus C.C. LIM</i>
1611 - 1618	EyeCam™ For Angle Imaging In Asian Eyes	<i>Dr Baskaran MANI</i>
1618 - 1625	Ocular Response Analyzer (ORA) Parameters In Chinese Subjects With Glaucoma	<i>Dr Arun NARAYANASWAMY</i>
1625 - 1632	Association Of Quantitative Iris Parameters And Anterior Chamber Width With Narrow Angles	<i>Dr Monisha E NONGPIUR</i>
1632 - 1639	Flap-On Versus Flap-Off Epilask: 6 Months Results	<i>Dr Karen B. REYES</i>
1639 - 1646	Anterior Chamber Angle Imaging With The Optovue Spectral Domain Optical Coherence Tomography	<i>Dr Rajesh SASIKUMAR</i>
1646 - 1655	Judges' Comments	

SYMPOSIUM IA: NEURO-OPHTHALMOLOGY

Topics in Neuro-Ophthalmic Examination and Management
Chair: Dr Alan SEALL, Dr Esther EU

1655 - 1710	Neuro-Ophthalmic History Taking And Examination	<i>Dr Clement TAN</i>
1710 - 1725	The Swollen Optic Disc	<i>Dr James CULLEN</i>
1725 - 1740	The Pale Optic Disc	<i>Dr Sharon TOW</i>
1740 - 1755	Approach To Diplopia	<i>A/Prof WAN HAZABBAH</i>
1755 - 1810	Approach To Abnormal Pupils	<i>Prof Randy KARDON</i>
1810 - 1825	Neuro-Otology: A Hidden Secret	<i>Prof Michael HALMAGYI</i>
1825 - 1840	Interesting Eye Movements	<i>Prof Michael HALMAGYI</i>
1840 - 1855	Question & Answer	

1855

END OF DAY ONE



**SCIENTIFIC PROGRAMME
DAY THREE**

Day Three - 17 October 2009, Saturday
Theatre, Suntec Singapore International Convention & Exhibition Centre
Time: 8.00am - 5.10pm

SYMPOSIUM III: GLAUCOMA

New Imaging Devices And Their Application In Optic Nerve Disease Diagnosis

Chairpersons: Dr Leonard YIP, Dr Jovina SEE

0800 - 0815	Anterior Segment OCT For Angle Imaging	<i>Dr Hon Tym WONG</i>
0815 - 0830	HRT3 To Detect And Follow-Up Glaucoma	<i>Dr David GARWAY-HEATH</i>
0830 - 0845	FDT And SITA-SWAP To Detect Early Glaucoma	<i>Prof Chris JOHNSON</i>
0845 - 0900	From Time Domain To Spectral Domain OCT	<i>Dr Leonard YIP</i>
0900 - 0915	Visual Fields - GPA And New VFI For Progression Monitoring	<i>Prof Chris JOHNSON</i>
0915 - 0930	Fourier Domain OCT: Ganglion Cell Complex Assessment, The New Strategy	<i>Prof Goji TOMITA</i>
0930 - 1000	Glaucoma Plenary Lecture New Imaging Devices And Their Application In Optic Nerve Disease Diagnosis	<i>Dr David GARWAY-HEATH</i>
1000 - 1015	Question & Answer	

1015 - 1100

TEA BREAK

SYMPOSIUM IV: NEURO-OPHTHALMOLOGY

Anterior Visual Pathways, Motility And Imaging

Chairpersons: Dr Su Ann LIM, Dr Yew Kim YEOW

1100 - 1115	Neuromyelitis Optica And Optospinal Multiple Sclerosis	<i>Prof Jun-ichi KIRA</i>
1115 - 1130	New Aspects Relating The Pupil Light Reflex And The Melanopsin Retinal Ganglion Cell To Clinical Practice	<i>Prof Randy KARDON</i>
1130 - 1145	Neuro-Protection In Optic Nerve Injuries	<i>Prof Robert Rong Kung TSAI</i>
1145 - 1200	Traumatic Optic Neuropathy	<i>Dr Su Ann LIM</i>
1200 - 1215	Ocular Motor Disorders. What Next?	<i>Dr Muhammad SIDIK</i>
1215 - 1230	Neuro-Imaging In Diagnosing Neuro-Ophthalmic Conditions	<i>Dr Tchoyoson LIM</i>
1230 - 1245	The Use Of OCT In Neuro-Ophthalmic Conditions	<i>Prof Randy KARDON</i>
1245 - 1300	Question & Answer	

1300 - 1400

THE EYE INSTITUTE, SINGAPORE EYE CENTRE
Improving Glaucoma Outcomes Through Optimizing Treatments

Chairperson: Dr Hon Tym WONG

1300 - 1305	Welcome and Introduction	<i>Dr Hon Tym WONG</i>
1305 - 1330	Optimizing Treatment Strategies In Glaucoma Management	<i>Dr David GARWAY-HEATH</i>
1330 - 1345	Maximizing Compliance And Adherence To Therapy	<i>A/Prof Tin AUNG</i>
1345 - 1400	Question & Answer	

1400

END OF PRIZENLUNG'S SYMPOSIUM



SCIENTIFIC PROGRAMME DAY TWO

Day Two - 16 October 2009, Friday
Theatre, Suntec Singapore International Convention & Exhibition Centre
Time: 8.00am - 5.30pm

NHG EYE INSTITUTE 2ND INTERNATIONAL OPHTHALMOLOGY CONGRESS OPENING CEREMONY

1315 - 1325 **Welcome And Opening Address** *A/Prof Tock Han LIM*
Director, NHG Eye Institute

SYMPOSIUM IB: NEURO-OPHTHALMOLOGY *Anterior Visual Pathways*

Chairpersons: A/Prof Kong Yong GOH, Dr Su Ann LIM

1325 - 1355 **Neuro-Ophthalmology Plenary Lecture** *Prof Randy KARDON*
Typical And Atypical Optic Neuritis

1355 - 1410 Central Nervous System Causes Of Visual Loss *Dr T UMAPATHI*

1410 - 1425 Ethambutol Toxic Optic Neuropathy *Dr Allen CLOMA*

1425 - 1440 **Question & Answer**

SYMPOSIUM II: GLAUCOMA *Advances In The Treatment Of Glaucoma*

Chairpersons: Dr Vernon YONG, Dr Tina WONG

1440 - 1500 Lens Removal As A Treatment: When And What To Expect *A/Prof Prin ROJANAPONGPUN*

1500 - 1515 Narrow Angles To Angle-Closure Glaucoma: Paradigms Of
Managing The Spectrum *Prof Clement THAM*

1515 - 1530 Optimising Trabeculectomy Outcomes *Prof Clement THAM*

1530 - 1545 **Question & Answer**

1600 - 1615 **Target IOP: How I Set It And Use It** *Dr Boon Ang LIM*

1615 - 1630 **Choosing The Right Anti-Glaucoma Medication For Optimal
Intraocular Pressure Lowering: The Evidence** *Dr Paul HEALEY*

1630 - 1645 **Central Corneal Thickness: How Does It Impact Our Management
Of Glaucoma?** *Dr David GARWAY-HEATH*

1645 - 1700 **Selective Laser Trabeculoplasty: Glaucoma Laser Surgery
Comes Of Age** *Dr Ching Lin HO*

1700 - 1715 **New Glaucoma Aqueous Shunts** *Dr Seng Kheong FANG*

1715 - 1730 **Question & Answer**

1730 **END OF DAY TWO**

Approach To Diplopia

Dr Wan Hazabbah Wan Hitam
Associate Professor & Head
Department of Ophthalmology
School of Medical Sciences
Universiti Sains Malaysia



Kampus Kesihatan
22 Kahang, Kubang, Kelantan



Introduction

- Diplopia is encountered almost exclusively in adults or in those with mature visual systems
- Young children may not be able to express this symptom d/t immature visual systems able to suppress the poorer image resulting in amblyopia.



Content

- Introduction
- Mechanisms
- History
- Examination
- Aetiologies
- Investigations
- Management
- Summary



Mechanism

- The 2 most common mechanisms for diplopia are:

1. ocular misalignment
2. ophthalmic aberrations

(defects of cornea, lens, iris or retina)



Introduction

- Derived from 2 Greek words:
 - Diplous – double
 - Ops - eye
- Anatomic & systematic approach - lead to an accurate diagnosis without extensive investigation.



Mechanism

3. Dysfunction of primary or secondary visual cortex

- bil monocular diplopia
- with no ocular aberration

4. Functional

- diplopia without any pathologic cause



Mechanism

- The most important clue for identification of the mechanism

- **monocular diplopia** (25%)
- **binocular diplopia** (75%)



Mechanism

Binocular diplopia

- ocular misalignment in a pt with normal binocular vision
- defined as diplopia that resolves when either eye is occluded

(Image that being viewed does not fall on fovea of both retinas, then the image appears to be in 2 different spatial locations)

Mechanism

Monocular diplopia

- defined as double vision that is present in affected eye while the other eye is occluded
- result of a local ocular aberration of cornea, iris, lens or retina
- not d/t misalignment of the eyes



Normal



Ghosting

Binocular Diplopia - Causes

- Orbital Disorders**
Trauma, mass or tumour, infection, thyroid-associated ophthalmopathy
- EOM Restriction**
Thyroid-associated ophthalmopathy, mass or tumour, extraocular muscle entrapment, injury or haematoma d/t surgery
- EOM Weakness**
Congenital myopathies, mitochondrial myopathies, muscular dystrophy
- Neuromuscular Junction Dysfunction**
Myasthenia gravis, botulism
- Palsies of 3rd, 4th or 6th Nerves**
Ischaemia, haemorrhage, tumour or mass, vascular malformation, aneurysm, trauma, meningitis, multiple sclerosis
- Brain Stem Injury to Cranial Nerve Nuclei**
Stroke, haemorrhage, tumour or mass, trauma, vascular malformation
- Supranuclear Injury**
Stroke, haemorrhage, tumour or mass, trauma, multiple sclerosis, hydrocephalus, syphilis, Wernicke encephalopathy, neurodegenerative disease

Monocular Diplopia - Causes

- Refractive Error**
- Corneal defect**
(e.g. irregular astigmatism)
- Iris defect/injury**
- Cataract**
- Macular Defect**
(e.g. epiretinal membrane, choroidal folds)
- Media opacities**
- Cerebral cortical dysfunction**
(bilateral monocular diplopia)



History

- Why need to differentiate - monocular or binocular?
 - critical to determine the mechanism & cause
 - Monocular diplopia**
 - focus on disorders of the eye
 - Binocular diplopia**
 - evaluate for causes of ocular misalignment
 - d/t neurologic or orbital disease

History

- Important information regarding
 - onset (abrupt/slow)
 - duration
 - frequency
 - associated symptoms
 - exacerbating or relieving factors.
- H/o of visual loss, trauma, childhood strabismus, amblyopia & prior ocular or strabismus surgery



History

Clues to Neurologic Causes

- primary or secondary visual cortex
 - visual perception of multiple images
- a. **Horizontal diplopia**
- related to the control & movement of MR, LR or both
- b. **Vertical diplopia**
- related to the control & movement of IO, SO, SR, IR or combination

History

Systemic review

- h/o DM, HPT or vascular disease
- headache & other neurologic complaints; muscle fatigue or weakness
- medications & drugs
- past medical & surgical history



History

Orbital Disease or EOM Restriction

- Any changes in appearance
- Old photographs
 - useful to detect subtle changes
- Recent ocular surgery, trauma & eye pain



History

Clues to Ophthalmic Causes

- most common causes of monocular diplopia are uncorrected refractive error & corneal defects
- Corneal defects
 - double vision/shadow images
- Cataract
 - poor vision & glare/ghost images
- Retinal (macula)
 - distortions of images



History

Neuromuscular Junction Dysfunction

- fluctuating weakness - hallmark
- diplopia that is absent in morning
 - worsens throughout the day
 - with reading
- >50% of MG present with ptosis & diplopia
 - without other symptoms or signs of weakness



History

3rd, 4th & 6th Cranial Nerve Palsies

- Cranial nerves can be injured along the course from eye to brain
- Isolated cranial nerve palsy
- h/o vascular risk factors HPT or DM
- microvascular ischaemic infarct
- Systemic vasculitis
- GCA - can present with jaw claudication, headache, scalp tenderness & arthralgia



History

6th Cranial Nerve Palsy

- pt experience horizontal double vision that is worse when the affected eye is abducted
- (ie, in lateral gaze toward the side of the affected eye)
- or when viewing objects at distance because the eyes must diverge



History

3rd Cranial Nerve Palsy

- typically presents with vertical & horizontal diplopia
- improves when the affected eye is abducted because the lateral rectus muscle & the 6th cranial nerve abduct the eye



History

Brain Stem Injury

- rarely results in isolated diplopia
- assoc. with neurologic symptoms
- Pts should be asked about neurological symptoms
 - facial numbness or weakness, hearing loss,
 - dysphagia, dysarthria,
 - vertigo & imbalance
 - incoordination, numbness, or weakness of extremities

History

4th Cranial Nerve Palsy

- result in vertical diplopia that is worse or only present with near vision & downward gaze in the opposite direction of affected eye
- pts also may report one of the images is tilted d/t SO muscle intorts the eye



History

Supranuclear Pathways

Dysconjugate gaze palsies

- Horizontal palsy
 - internuclear ophthalmoplegia (INO)



- characterized by an adduction deficit in the eye on same side as the lesion with simultaneous nystagmus of the abducting eye during lateral gaze & it is commonly assoc. with MS or stroke

Examination

Monocular Diplopia

- Complete ophthalmologic examination
 - slit lamp examination & fundoscopy
- Refraction
- If pinholes correct the diplopia - the cause likely involves cornea or lens

Examination

Extraocular Muscle Movement Examination

- If EOM movement is limited, need to determine the cause:
 - restrictive process
 - muscle weakness
 - neuromuscular junction dysfunction
 - cranial nerve palsy
 - or supranuclear process



Examination

Binocular Diplopia

- Evaluation of EOM movement
- Globe, Orbit & Eyelid Examination
- Complete general neurologic examination



Examination

Neuromuscular Junction Examination

- Evaluation for fatigable EOM & fatigable eyelid
- Ptosis
 - weakness of levator palpebrae
- Cogan's lid twitch
- Triad of OMG - fatigable ptosis
 - fatigable of EOM
 - weakness of orbicularis oculi muscles



Examination

Globe, Orbit & Eyelid Examination

- Exophthalmometer - measure proptosis or enophthalmos
- Eyelid function & eyelid-position
 - lid retraction & lid lag
- Ptosis
- Old photographs - help to differentiate acute vs chronic



Examination

3rd Cranial Nerve

- Injury results in:
 - limited supraduction, infraduction & adduction
 - pupil mydriasis & partial or complete pupil paralysis to light
 - partial or complete ptosis



- complete pupil-sparing often d/t to ischaemia

Examination

4th Cranial Nerve

- d/t intorsion action of SO muscle
 - separation of doubled images increases when the head is tilted toward the side of 4th nerve palsy
 - the deficit improves when the head is tilted to the opposite side of 4th nerve palsy
- head slightly tilted to the opposite side of 4th nerve palsy



Imaging Studies

CT scan or MRI (with contrast) of skull & orbits

- TRO intracranial masses or other pathologic processes
 - Blow-out fracture
 - Enlarged muscles - thyroid ophthalmopathy
 - Tumor of orbit
 - Tumor along cranial nerve pathway
 - Increased ICP
 - Aneurysm of intracranial carotid artery
 - Carotid cavernous fistula - Angiography
 - Disease of sinuses
 - Bony disorders



Examination

6th Cranial Nerve



- When the unaffected eye is fixating on a distant target in primary gaze, the affected eye is often deviated inward (esotropia)

Other Tests

- Tensilon test – OMG



- Park three-step test
 - able to evaluate which 4 EOM responsible for vertical eye movements are responsible for a vertical diplopia
- Goldmann perimeter
 - single binocular vision

Examination

Brain Stem Examination

- Examination of 3rd, 4th & 6th cranial nerves
- as well as all other cranial nerves



Treatment

Medical Care

- Patching one eye



- Occlusive lenses
- Fresnel prisms
- Treatment of MG
 - Mestinon/long-acting anticholinergic agent, corticosteroids

Treatment

Surgical Care

- Strabismus surgery
 - occasionally necessary
- Transposition surgery
 - permanent paralysis of LR muscle
- Knapp SO muscle paralysis
 - permanent weakness of SO muscle
- Botox Injection
 - injections into MR muscle d/t a weak LR in 6th nerve palsy.



Summary

- Evaluation of diplopia can be daunting without a basic understanding of mechanisms & anatomy involved
- A systematic approach is important to uncover the mechanism of diplopia & to appropriately direct the work-up & management

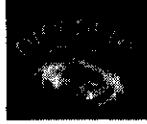


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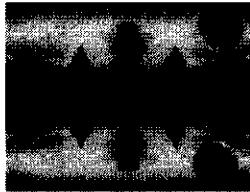
Approach To Diplopia

Dr Wan Hazatibah Wan Hajar
Associate Professor & Head
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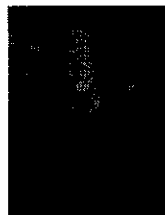
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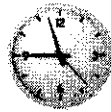
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- ocular misalignment in a pt with normal binocular vision
- defined as diplopia that resolves when either eye is occluded

(Image that being viewed does not fall on fovea of both retinas, then the image appears to be in 2 different spatial locations)

Binocular Diplopia - Causes

- **Orbital Disorders**
Trauma, mass or tumour, infection, thyroid-associated ophthalmopathy
- **EOM Restriction**
Thyroid-associated ophthalmopathy, mass or tumour, extraocular muscle entrapment, injury or haemorrhage of surgery
- **EOM Weakness**
Congenital myopathies, mitochondrial myopathies, muscular dystrophy
- **Neuromuscular Junction Dysfunction**
Myasthenia gravis, botulism
- **Palsies of 3rd, 4th or 6th Nerves**
Ischaemia, haemorrhage, tumour or mass, vascular malformation, aneurysm, trauma, meningitis, multiple sclerosis
- **Brain Stem Injury to Cranial Nerve Nuclei**
Stroke, haemorrhage, tumour or mass, trauma, vascular malformation
- **Supranuclear Injury**
Stroke, haemorrhage, tumour or mass, trauma, multiple sclerosis, hydrocephalus, syphilis, Wernicke encephalopathy, neurodegenerative disease

History

- Why need to differentiate - monocular or binocular?
 - critical to determine the mechanism & cause
 - **Monocular diplopia**
 - focus on disorders of the eye
 - **Binocular diplopia**
 - evaluate for causes of ocular misalignment
 - d/t neurologic or orbital disease

History

- Important information regarding
 - onset (abrupt/slow)
 - duration
 - frequency
 - associated symptoms
 - exacerbating or relieving factors.



- H/o of visual loss, trauma, childhood strabismus, amblyopia & prior ocular or strabismus surgery

History

Systemic review

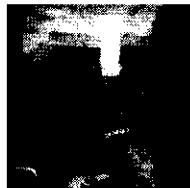
- h/o DM, HPT or vascular disease
- headache & other neurologic complaints; muscle fatigue or weakness
- medications & drugs
- past medical & surgical history



History

Clues to Ophthalmic Causes

- most common causes of monocular diplopia are uncorrected refractive error & corneal defects
- Corneal defects
 - double vision/shadow images
- Cataract
 - poor vision & glare/ghost images
- Retinal (macula)
 - distortions of images



History

Clues to Neurologic Causes

- primary or secondary visual cortex
 - visual perception of multiple images
- a. Horizontal diplopia**
- related to the control & movement of MR, LR or both
- b. Vertical diplopia**
- related to the control & movement of IO, SO, SR, IR or combination

History

Orbital Disease or EOM Restriction

- Any changes in appearance
- Old photographs
- useful to detect subtle changes



- Recent ocular surgery, trauma & eye pain

History

Neuromuscular Junction Dysfunction

- fluctuating weakness - hallmark
- diplopia that is absent in morning
- worsens throughout the day
- with reading



- >50% of MG present with ptosis & diplopia
- without other symptoms or signs of weakness

History

3rd, 4th & 6th Cranial Nerve Palsies

- Cranial nerves can be injured along the course from eye to brain
- Isolated cranial nerve palsy
 - h/o vascular risk factors HPT or DM
 - microvascular ischaemic infarct
- Systemic vasculitis
 - GCA - can present with jaw claudication, headache, scalp tenderness & arthralgia



History

3rd Cranial Nerve Palsy

- typically presents with vertical & horizontal diplopia
- improves when the affected eye is abducted because the lateral rectus muscle & the 6th cranial nerve abduct the eye



History

4th Cranial Nerve Palsy

- result in vertical diplopia that is worse or only present with near vision & downward gaze in the opposite direction of affected eye
- pts also may report one of the images is tilted
 - d/t SO muscle intorts the eye



History

6th Cranial Nerve Palsy

- pt experience horizontal double vision that is worse when the affected eye is abducted
(ie, in lateral gaze toward the side of the affected eye)
- or when viewing objects at distance because the eyes must diverge



History

Brain Stem Injury

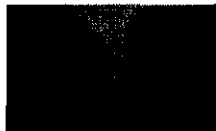
- rarely results in isolated diplopia
- assoc. with neurologic symptoms
- Pts should be asked about neurological symptoms
 - facial numbness or weakness, hearing loss,
 - dysphagia, dysarthria,
 - vertigo & imbalance
 - incoordination, numbness, or weakness of extremities

History

Supranuclear Pathways

Dysconjugate gaze palsies

- Horizontal palsy
 - internuclear ophthalmoplegia (INO)

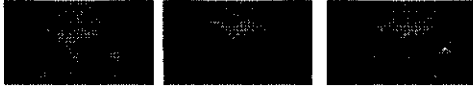


- characterized by an adduction deficit in the eye on same side as the lesion with simultaneous nystagmus of the abducting eye during lateral gaze & it is commonly assoc. with MS or stroke

Examination

Extraocular Muscle Movement Examination

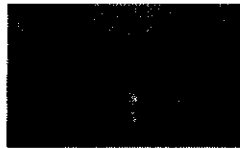
- If EOM movement is limited, need to determine the cause:
 - restrictive process
 - muscle weakness
 - neuromuscular junction dysfunction
 - cranial nerve palsy
 - or supranuclear process



Examination

Neuromuscular Junction Examination

- Evaluation for fatigable EOM & fatigable eyelid
- Ptosis
 - weakness of levator palpebrae
- Cogan's lid twitch
- Triad of OMG - fatigable ptosis
 - fatigable of EOM
 - weakness of orbicularis oculi muscles



Examination

3rd Cranial Nerve

- Injury results in:
 - limited supraduction, infraduction & adduction
 - pupil mydriasis & partial or complete pupil paralysis to light
 - partial or complete ptosis



- complete pupil-sparing often d/t to ischaemia

Examination

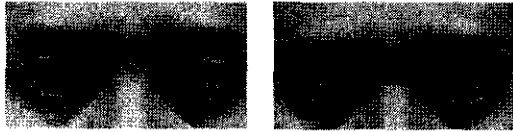
4th Cranial Nerve

- d/t intorsion action of SO muscle
 - separation of doubled images increases when the head is tilted toward the side of 4th nerve palsy
 - the deficit improves when the head is tilted to the opposite side of 4th nerve palsy
- head slightly tilted to the opposite side of 4th nerve palsy



Examination

6th Cranial Nerve

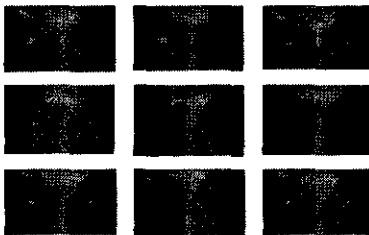


- When the unaffected eye is fixating on a distant target in primary gaze, the affected eye is often deviated inward (esotropia)

Examination

Brain Stem Examination

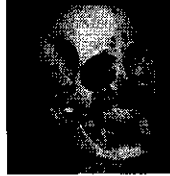
- Examination of 3rd, 4th & 6th cranial nerves
- as well as all other cranial nerves



Imaging Studies

CT scan or MRI (with contrast) of skull & orbits

- TRO intracranial masses or other pathologic processes
 - Blow-out fracture
 - Enlarged muscles - thyroid ophthalmopathy
 - Tumor of orbit
 - Tumor along cranial nerve pathway
 - Increased ICP
 - Aneurysm of intracranial carotid artery
 - Carotid cavernous fistula - Angiography
 - Disease of sinuses
 - Bony disorders



Other Tests

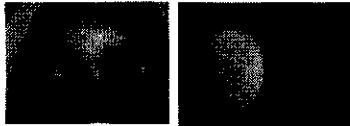
- Tension test – OMG



- Park three-step test
 - able to evaluate which 4 EOM responsible for vertical eye movements are responsible for a vertical diplopia
- Goldmann perimetry
 - single binocular vision

Treatment

Medical Care

- Patching one eye
- 
- Occlusive lenses
 - Fresnel prisms
 - Treatment of MG
 - Mestinon/long-acting anticholinergic agent, corticosteroids

Treatment

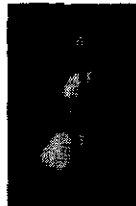
Surgical Care

- Strabismus surgery
 - occasionally necessary
- Transposition surgery
 - permanent paralysis of LR muscle
- Knapp SO muscle paralysis
 - permanent weakness of SO muscle
- Botox Injection
 - injections into MR muscle d/t a weak LR in 6th nerve palsy.



Summary

- Evaluation of diplopia can be daunting without a basic understanding of mechanisms & anatomy involved
- A systematic approach is important to uncover the mechanism of diplopia & to appropriately direct the work-up & management



Thank You