

2. Oculomotor system:

anatomy & physiology	symptoms	signs	investigations	treatments
<p>Saccadic system Pursuit system Vergence system Oculo-cephalic reflex</p> <p>III cranial nerve IV cranial nerve VI cranial nerve</p> <p>Neuromuscular junction</p> <p>Extraocular muscles & tendons</p>	<p>diplopia</p> <p>oscillopsia</p> <p>visual vertigo</p>	<p><u>ocular misalignment:</u></p> <ul style="list-style-type: none"> - concomitant - incomitant - abnormal head posture <p><u>infranuclear:</u></p> <ul style="list-style-type: none"> - cranial nerve palsies - myasthenic - myopathic - restrictive - abnormal synkinesis <p><u>supranuclear:</u></p> <ul style="list-style-type: none"> - gaze palsies - Parinaud - internuclear ophthalmoplegia - convergence insufficiency - cerebellar signs - vestibular signs - nystagmus - saccadic intrusions 	<p><u>orthoptic:</u></p> <ul style="list-style-type: none"> - prism cover test - Hess / Lees - Maddox - field of binocular single vision <p><u>neurophysiology:</u></p> <ul style="list-style-type: none"> - single-fibre EMG - repetitive nerve stimulation <p><u>blood tests</u></p> <p><u>imaging</u></p> <p><u>other:</u></p> <ul style="list-style-type: none"> - forced duction test - Tensilon test - muscle biopsy 	<p>prisms</p> <p>exercises</p> <p>medical</p> <p>muscle surgery</p> <p>botulinum toxin</p>

Conditions:

supranuclear	infranuclear
<p><u>Causes of:</u></p> <ul style="list-style-type: none"> - gaze palsies - Parinaud - internuclear ophthalmoplegia - nystagmus - saccadic intrusions <p><u>Other:</u></p> <ul style="list-style-type: none"> - progressive supranuclear palsy 	<p><u>Causes of:</u></p> <ul style="list-style-type: none"> - III nerve palsy - IV nerve palsy - VI nerve palsy - myasthenic syndromes - myopathies <p><u>Other:</u></p> <ul style="list-style-type: none"> - superior oblique myokymia - Duane's retraction syndrome - Brown's syndrome

3. Lids:

anatomy & physiology	symptoms	signs	investigations	treatments
lid opening lid closure	ptosis lid retraction lid twitching	ptosis lid retraction blepharospasm apraxia of lid opening	(see under oculomotor system)	oculoplastic surgery botulinum toxin

4. Autonomic nerves (pupils, lacrimation & accommodation):

anatomy & physiology	symptoms	signs	investigations	treatments
parasympathetic pathways sympathetic pathways	anisocoria blurred vision dry eyes crocodile tears	Horner tonic pupil relative afferent pupil defect light-near dissociation tear deficiency accommodative spasm accommodative weakness	pharmacological tests of the pupil Schirmer's test imaging	<u>Medical:</u> - artificial tears - cycloplegics <u>Optical:</u> - near adds - cosmetic contact lenses <u>Surgical:</u> - punctual plugs - botulinum toxin (to lacrimal gland)

5. Orbits:

anatomy & physiology	symptoms	signs	investigations	treatments
bones muscles nerves vessels fibrous septa superior orbital fissure inferior orbital fissure optic canal	proptosis / enophthalmos adnexal swelling pain	<u>globe malposition:</u> - proptosis / enophthalmos - hyper / hypoglobus <u>eye:</u> - choroidal folds - gaze-dependent changes in intraocular pressure <u>other:</u> - bruit - vascular signs - inflammatory signs - restrictive eye movements	<u>blood tests</u> <u>imaging</u> - U/S - XR - CT / MRI <u>biopsy</u>	<u>medical:</u> - anti-inflammatory - antibiotics <u>surgical:</u> - excise lesion - decompression <u>Other:</u> - radiotherapy

Conditions (affecting lids, autonomic supply or orbits):

lids	pupils	lacrimal	orbital
blepharospasm Meige's syndrome causes of hemifacial spasm jaw-winking synkinesis causes of VII nerve palsy	Holmes-Adie syndrome internal carotid artery dissection autonomic neuropathies	Sjogren's syndrome	thyroid eye disease other inflammatory orbital conditions carotid-cavernous fistula causes of orbital apex syndrome causes of superior orbital fissure / cavernous sinus syndrome

6. Neuro-ophthalmic emergencies - defined as conditions that can blind or cause serious morbidity/mortality *before* a specialist neuro-ophthalmic opinion can be obtained

visual system	oculomotor system	lids, pupils or orbital
temporal arteritis		
inflammatory optic neuropathy (non-demyelinating)	III nerve palsy	VII nerve palsy
compressive optic neuropathy	myaesthesia gravis	internal carotid artery dissection
papilloedema	pituitary apoplexy	carotid-cavernous fistula
pituitary apoplexy		

7. Pitfalls and mimickers in Neuro-ophthalmology

Retinal conditions misdiagnosed as optic neuropathies	Miscellaneous conditions
Cone dystrophies and other congenital retinopathies	Keratoconus
Subtle macular conditions (hole, edema)	Non-glaucomatous optic disc excavation
Prior branch or central retinal artery occlusion	Functional, non-organic visual loss
CAR, MAR	Visual agnosia, other high-order, cognitive symptoms
Big blind spot retinal syndromes (MEWDS, etc)	
Acute zonal outer occult retinopathy	

8. Ocular, facial pain and headache

Migraine, cluster headache, trigeminal neuralgia, ocular ischemic syndrome, herpes zoster

9. Drug-induced Neuro-ophthalmological disorders

Ethambutol, isoniazid, amiodarone, viagra, cytokine modulators, cyclosporine, statins, D-penicillamine, aminoglycosides, cisplatin, carboplatin, nitosureas, vincristine, isotretinoin, minocycline, nalidixic acid, prednisolone, lithium, growth hormone, nitrofurantoin, ciprofloxacin and tamoxifen