Step Wise Approach

- There are many possible etiologies for ocular misalignment or complaints of diplopia.
- A stepwise approach with your examination techniques can be helpful:
  - Assess the patient’s ductions
  - Technique here is very important, deficits may be subtle

Ductions

Grade as a percentage = 75%

Ductions: recording

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th></th>
<th>OS</th>
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<tbody>
<tr>
<td>100%</td>
<td>75%</td>
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Step Wise Approach

- A stepwise approach with your examination techniques can be helpful:
  - Assess the patient’s ductions
  - Perform cover testing in multiple positions of gaze

Cover Testing: technique

- No glasses
- Large Target
- Check fixation (constantly)
Cover Testing: recording

<table>
<thead>
<tr>
<th>Right head tilt</th>
<th>up</th>
<th>Left head tilt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right gaze</td>
<td>Primary</td>
<td>Left gaze</td>
</tr>
<tr>
<td>down</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Must check head tilts if there is a vertical deviation
- Look for comitancy
  - >4 pd can be significant
  - Phoria vs. tropia is generally not significant

Cover Testing Patterns:

- Cover testing: Abduction deficit (CN VI Palsy)

  - Increasing eso-deviation in right gaze, consistent with a right abduction deficit

<table>
<thead>
<tr>
<th>Up Gaze</th>
<th>Left Gaze</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>0-10</td>
</tr>
<tr>
<td>Right Gaze</td>
<td>Primary Gaze</td>
</tr>
<tr>
<td>0-5</td>
<td>10-20</td>
</tr>
<tr>
<td>Down Gaze</td>
<td>Left Gaze</td>
</tr>
<tr>
<td>10-20</td>
<td>0-5</td>
</tr>
</tbody>
</table>

Cover Testing Patterns: CN III

- Recall cranial nerve III innervates superior rectus, inferior rectus, medial rectus, and inferior oblique
- Let us damage a right CN III to demonstrate the "pattern"
What is the “pattern” of a CN III palsy?

Reversing hyper
Cover testing Pattern:

<table>
<thead>
<tr>
<th></th>
<th>Left hyper</th>
<th>Exo</th>
<th>Right hyper</th>
</tr>
</thead>
</table>

Cover testing Pattern: CN III

- Reversing hyper with increasing exo across from the vertically limited eye

Cover testing pattern:

- CN IV
  - Functions as a depressor in the adducted position
Cover testing pattern:

- CN IV
  - Functions as a depressor in the adducted position
  - 2 other functions: intorsion and abduction

Cover testing Patterns:

- Let us damage a right cranial nerve IV to determine the “pattern”
  - Right CN IV has been lesioned: if you know the function you will know the deficit:
    1) Depression (when the eye is adducted)

Cover testing Pattern: CN IV

- If there is a vertical deviation, you must perform head tilts …
  - Right hyper
Case 1:

- 55 year old African American male presents emergently with complaint of double vision
  - Started sometime after coming home from the hospital last week
    - due to headache – CT normal and told he was dehydrated
  - Worse when looking to the left, images are side by side
  - Health history:
    - Type 2 diabetes x 20 years: LFBS 147mg/dL, unknown A1c
    - Hypertension: blood pressure in office: 158/90
    - Color cancer diagnosed 2016 s/p resection, radiation and chemo x 2 with mets to shoulder spine, and lower back

Cover testing Pattern: CN IV

- Hyper deviation worse in contralateral gaze and ipsilateral head tilt

Step Wise Approach

- A stepwise approach with your examination techniques can be helpful:
  - Assess the patient’s ductions ✓
  - Perform cover testing in multiple positions of gaze ✓
  - Look for additional signs to localize the lesion anatomically:
    - Brain
    - Nerve
    - Neuro-muscular junction
    - Orbit

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Case 1

- BCVA 20/24 OD, 20/70 OS
- Pupils: equal, 6-9 log APD OS
- Confrontation: constriction inferior and superior temporal OS
- EOMs: 75% abduction OS, 100% elsewhere

<table>
<thead>
<tr>
<th>4 exo</th>
<th>6-6 exo</th>
<th>1 exo</th>
<th>16 exo</th>
<th>5 Right Hyper</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Exo</td>
<td>4 exo</td>
<td>6 exo</td>
<td>4-6 exo</td>
<td>8 eso</td>
</tr>
<tr>
<td></td>
<td>65 Eso</td>
<td>16 Eso</td>
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</table>

Dilated exam:
- Status post PRP OU and retinal detachment repair OS
- Few scattered dot and blot hemes with regressed neo OU
- Plan:
  - Recommend blood work and neuroimaging promptly

Returned 1 month later emergently with complaint of worsening headache
- Feels as though diplopia is worsening
- Completed blood work remarkable for
  - Elevated ESR 120
  - CRP: 28 (norm 0-4.9)
  - FTA-ABS was reactive (RPR not performed)

BP: 156/92
- Exam stable aside from:
  - 0% abduction OS
- Plan emergent hospitalization for neuroimaging, potential temporal artery biopsy and RPR

Developed complete left facial palsy one day after being admitted (occurred before TAB)
- Treated with oral steroid “got better”
- Consults:
  - Neurology
  - Rheumatology: felt as though temporal arteritis unlikely
  - Internal medicine

Hospitalized for 6 days
- MRI brain and orbits with and without contrast: “no pathologic enhancement observed to suggest intracranial metastatic disease”
- Left temporal artery biopsy: “elastic artery with no evidence of arteritis”
- now admits to being treated for syphilis at age of 19, RPR was non reactive
- Lumbar puncture: no viral, infectious, fungal
Case 1

- Exam:
  - Lethargic
  - Complete left facial palsy
  - 10% abduction OS
- Plan: concern for mets/carcinomatous meningitis
  - CALL his doctors
    - Neurologist → neurologist → neurologist's medical assistant
    - Oncologist → nurse practitioner "come right over"
    - "Hospitalized "gait disturbance"

Step Wise Approach

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  - Perform cover testing in multiple positions of gaze
  - Look for additional signs to localize the lesion anatomically:
    - Brain
    - Nerve
    - Neuro-muscular junction
    - orbit

Localizing

- Brain:
  - Other neurologic signs and symptoms?

Localizing

- Durato's Canal:
  - Papilledema
- Cavernous Sinus and orbital fissure: multiple cranial neuropathies
Localizing

Don’t forget:
Neuro-muscular junction: Fatigue?

Step Wise Approach

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  - Perform cover testing in multiple positions of gaze
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    - Nerve
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    - Orbit

Conclusuion

- A stepwise approach with your examination techniques can be helpful in cases of ocular misalignments and may aid in localizing the lesion to the brain, nerve, neuromuscular junction, or orbit.