• Definition
• Anatomy of the TRIGEMINAL NERVE
• Aetiology
• Clinical presentation
• Differential diagnosis
• Treatment
• Summary
DEFINITION OF TGN

- Paroxysmal lancinating electrical shock like pain confined to the distribution of one or more branches of the trigeminal nerve (TN)
The trigeminal nerve has three divisions which enervate the forehead and eye (ophthalmic V1), cheek (maxillary V2) and lower face and jaw (mandibular V3). It functions in sensing facial touch, pain and temperature, as well as controlling masticator muscles.

The three divisions of the trigeminal nerve come together and forms the Gasserion ganglion which lies on the apex of the petrous bone in the middle fossa. From there, the motor and sensory nerve roots continues back and enters the the brainstem at the midpontine level. Within the brain stem, the signals travel to the trigeminal nerve nucleus.
ANATOMY of Trigeminal Nerve

- Peripheral Branches
- Trigeminal Nerve Divisions
- Gasserian Ganglion
- Brain Stem
- Trigeminal Nerve Nucleus
- V1
- V2
- V3
- Trigeminal Nerve Root

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AETIOLOGY OF TRIGEMINAL NEURALGIA (TGN)

- Irritation/compression of the trigeminal nerve at the root entry zone (brainstem)
AETIOLOGY OF TGN

- Irritation/compression of the trigeminal nerve at the root entry zone (brainstem)
  - BLOOD VESSELS
AETIOLOGY OF TGN

- Irritation/compression of the trigeminal nerve at the root entry zone (brainstem)
  - BLOOD VESSELS
• Irritation/compression of the trigeminal nerve at the root entry zone (brainstem)

– TUMOURS
In multiple sclerosis (MS) a plaque within the brainstem may cause trigeminal neuralgia (TGN)

- 2% of patients with MS have TGN
- 18% of patients with bilateral TGN have MS
**EPIDEMIOLOGY of TGN**

<table>
<thead>
<tr>
<th>AGE</th>
<th>TYPICALLY &gt; 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female: Male</td>
<td>1.8:1</td>
</tr>
<tr>
<td>unilateral</td>
<td>99%</td>
</tr>
<tr>
<td>bilateral</td>
<td>1% (investigate for MS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIVISIONS INVOLVED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>V1 only</td>
<td>2%</td>
</tr>
<tr>
<td>V2 only</td>
<td>20%</td>
</tr>
<tr>
<td>V3 only</td>
<td>17%</td>
</tr>
<tr>
<td>V1 and V2</td>
<td>14%</td>
</tr>
<tr>
<td><strong>V2 and V3</strong></td>
<td><strong>42%</strong></td>
</tr>
<tr>
<td>All three</td>
<td>5%</td>
</tr>
</tbody>
</table>
CLINICAL PRESENTATION

- Brief intense paroxysms of pain in one or more divisions of the trigeminal nerve (TN)
  - Intense stabbing/electrical shocks
  - Lasting a few seconds
  - Almost always unilateral
  - 2\textsuperscript{nd} or 3\textsuperscript{rd} divisions of TN (mouth most common site)
  - More pronounced during the day (mostly pain-free at night)
CLINICAL PRESENTATION

• Attacks may be TRIGGERED by:
  – Light cutaneous stimuli
  – Shaving
  – Washing
  – Chewing
  – Brushing their teeth
  – Applying makeup
CLINICAL PRESENTATION

• **Characteristic:**

Patient “guarding their face”
CLINICAL PRESENTATION

• **Characteristic:**

There is a tendency for spontaneous remission with pain-free intervals of weeks or months (lack of any pain-free interval is atypical for TGN)
Characteristics NOT typical of TGN

- Sustained pain that is not paroxysmal
- Slowly developing pain that builds in intensity and lasts for variable periods of time (hours - days)
- Periorbital pain at night (cluster headaches)
• The exam should be NORMAL in TGN (except very mild sensory loss)
• Any neurological deficits should prompt search for structural cause (e.g. tumour)
  – Assess sensation in all 3 divisions of TN (incl. corneal reflexes)
  – Assess masseter function (bite) and pterygoid function (opening mouth, chin deviates to weak side)
  – Assess extra-ocular muscles (may indicate other associated cranial nerve deficits from tumour compression)
Sweet et al identify 5 major clinical features that define the diagnosis of Trigeminal Neuralgia (TGN):

1. Pain is paroxysmal ("sudden, severe")
2. The pain may be provoked by light touch to the face (trigger zones)
3. The pain is confined to the trigeminal distribution
4. The pain is unilateral
5. The clinical sensory examination is normal
DIFFERENTIAL DIAGNOSIS

- Atypical facial pain syndromes
- Herpes zoster
- Dental disease
- Sinusitis
- Orbital/Ocular disease
- Temporomandibular joint (TMJ) dysfunction
- Cluster headaches
- Temporal arteritis
- Glossopharyngeal neuralgia (throat & base of tongue pain radiates to the ear)
FACIAL PAIN: DIAGNOSTIC APPROACH

– Site of the pain

Postherpetic Neuralgia (usually V1 distribution)
FACIAL PAIN: DIAGNOSTIC APPROACH

- **Site of the pain**

  Atypical facial pain (diffuse)
FACIAL PAIN: DIAGNOSTIC APPROACH

– **Site of the pain**

Trigeminal Neuralgia (V1,V2,V3)
– Site of the pain

Dental disease (around mouth)
FACIAL PAIN: DIAGNOSTIC APPROACH

– Site of the pain

Sinusitis: Maxillary or frontal
– Site of the pain

Cluster Headache
FACIAL PAIN: DIAGNOSTIC APPROACH

– Site of the pain

Orbital disease (glaucoma)
FACIAL PAIN: DIAGNOSTIC APPROACH

- Site of the pain

TMJ-disease (anterior and posterior to ear)
FACIAL PAIN: DIAGNOSTIC APPROACH

- **Quality of the pain**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigeminal neuralgia</td>
<td>Sharp, stabbing, shooting, paroxysmal</td>
</tr>
<tr>
<td>Atypical facial pain</td>
<td>Dull, persisting</td>
</tr>
<tr>
<td>Postherpetic neuralgia</td>
<td>Dull, persisting, burning, occasional paroxysm</td>
</tr>
<tr>
<td>Dental</td>
<td>Dull</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>Sharp, boring, worse in the morning</td>
</tr>
<tr>
<td>Ocular</td>
<td>Dull, throbbing</td>
</tr>
<tr>
<td>TMJ-dysfunction</td>
<td>Severe aching, aggravated by chewing</td>
</tr>
<tr>
<td>Cluster headache</td>
<td>Sharp, intermittent</td>
</tr>
</tbody>
</table>
## FACIAL PAIN: DIAGNOSTIC APPROACH

### Associated symptoms/signs

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Trigeminal neuralgia</td>
<td>Often no neurological deficit</td>
</tr>
<tr>
<td>Atypical facial pain</td>
<td>Accompanying depressive illness in young or middle aged woman</td>
</tr>
<tr>
<td>Postherpetic neuralgia</td>
<td>Scarring, associated sensory loss</td>
</tr>
<tr>
<td>Dental</td>
<td>Swelling of lips/face</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>Puffy appearance around eyes, percussion tenderness over involved sinus</td>
</tr>
<tr>
<td>Ocular</td>
<td>Visual blurring/haloes/visual loss</td>
</tr>
<tr>
<td>TMJ-dysfunction</td>
<td>Tenderness over TMJ joint</td>
</tr>
<tr>
<td>Cluster headache</td>
<td>Associated lacrimation/rhinorrhoea</td>
</tr>
</tbody>
</table>
ATYPICAL FACIAL PAIN

- Diffuse, Dull, Persistent pain spreading over one or both sides of the face (not in trigeminal branch distribution)

- Often seen in young or middle aged woman with the underlying depression

- Respond well to antidepressant therapy
Frequently affects trigeminal territory (often V1 division) with painful ‘herpetic rash’ and corneal involvement.

The acute symptoms may resolve but lead to chronic postherpetic neuralgia which slowly improves.
HERPES ZOSTER
cluster headaches

- **Characteristics:**
  - Males, severe unilateral orbital / supra-orbital
  - Characteristic maneuvers that lessens the pain: sitting upright, rocking to and fro

- **Common associations:**
  - Conjunctival injection, lacrimation, nasal congestion, rhinorrhea, Transient Horner’s Syndrome

- **Duration:** 30 min to 3 hrs

- **Frequency of attacks:** 1 – 8 attacks per day. (This typically happens 90 minutes after a person falls asleep)

- “Clusters” of attacks are separated by weeks or months
- **Rx= Verapamil**
GIANT CELL (TEMPORAL) ARTERITIS

Clinical presentation
- Severe throbbing headache overlying the involved vessel in the elderly ptx
- Thickened, tender, non-pulsatile artery
- Jaw claudication (pathognomonic): pain with chewing/talking

Diagnosis: raised ESR
Treatment: prednisolone
SPECIAL INVESTIGATIONS – guided by clinical suspicion

- **Blood tests**
  - ESR, FBC
- **Dental x-rays**
- **CT Skull/Brain**
- **MRI Brain**
  - Exclude intracranial tumours or MS plaques, especially in cases with atypical features
  - The yield in typical trigeminal neuralgia (TGN) patients is low
TREATMENT

- MEDICAL
- SURGICAL DECOMPRESSION
- ALTERNATIVE PROCEDURES
TREATMENT

• MEDICAL
  – TEGRETOL (Carbamazepine)

  • Complete or acceptable relief in 70%
  • 100 mg BD, increase by 200 mg per day up to a maximum of 1200 mg per day divided TDS
  • Side-effects: drowsiness, rash (5 to 10%), leukopenia (usually does not require discontinuing drug)
• **MEDICAL**
  - **Lioresal** (Baclofen)
    - Second drug of choice
    - Not as effective, but fewer side effects than Tegretol
    - May be more effective when used in conjunction with low-dose Tegretol
    - 5 mg TDS, maximum dose 80 mg/day
TREATMENT

• MEDICAL
  – NEURONTIN (gabapentin)

  • May act synergistically with Tegretol and Lioresal
  • Side-effects: ataxia, sedation, rash
  • 100 mg BD, maximum dose 3600 mg/day
TREATMENT

- **MEDICAL**
  - Other miscellaneous drugs which may be effective

  - Phenytoin
  - Clonazepam
  - Lamotrigine (Lamictal)
  - Amitriptyline (more commonly used for atypical facial pain)
  - Botox (direct effect on the sensory nerve fibres)
• **SURGERY**
  
  – Microvascular decompression (MVD)
    • Indication: inadequate medical control or inability to tolerate medical treatment
    • Procedure of choice

• 95-99% Immediate Pain Control

• 75-80% Cure Rate
TREATMENT

• SURGERY
  – Vascular compression of the Trigeminal nerve
TREATMENT

• **SURGERY**

  – **Microvascular decompression (MVD)**
**ALTERNATIVE TREATMENT**
*(for high-risk surgical candidates)*

<table>
<thead>
<tr>
<th>Technique</th>
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</thead>
<tbody>
<tr>
<td><strong>Peripheral nerve techniques</strong></td>
</tr>
<tr>
<td>– Nerve block</td>
</tr>
<tr>
<td>– Avulsion of the supra-/infraorbital nerves</td>
</tr>
<tr>
<td><strong>Traumatising the trigeminal ganglion</strong></td>
</tr>
<tr>
<td>– Glycerol</td>
</tr>
<tr>
<td>– Balloon inflation</td>
</tr>
<tr>
<td>– Radio-frequency thermocoagulation</td>
</tr>
<tr>
<td><strong>Stereotactic radiosurgery</strong></td>
</tr>
<tr>
<td>– Trigeminal Nerve root entry zone (at the brainstem)</td>
</tr>
</tbody>
</table>
ALTERNATIVE TREATMENT
Radio-frequency thermocoagulation
– **History most NB**: paroxysmal sharp electric shocks in one or more branches of the TN, usually unilateral

– Characterised by sensory **triggers**, periods of **remission** and initial response to Carbamazepine (**Tegretol**)

– Neurological examination: **Normal**

– Aetiology: **vascular compression** of the trigeminal nerve

– 75% will ultimately fail medical therapy and require a procedure