Carpel Tunnel Syndrome – Diagnosis and Management

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Moderators Dr PSC / Dr VT
Introduction

• Entrapment Neuropathy –

✓ Pressure induced injury to peripheral nerve
✓ Secondary to anatomic or pathologic structures

• Debilitating clinical condition with –

✓ Physical
✓ Psychological
✓ Economical
Patho-physiology

Early changes
- Disruption of blood-nerve barrier
- Dysfunction of intra-neural circulation
- Morphometric changes not apparent

Reversible
- Persistent ischemia
- Segmental Demyelination

Irreversible
- Edema with epineural fibrosis & nerve thickening
- Damage to myelin sheath & axonal disruption
Median Nerve – Carpel Tunnel Syndrome

- Prevalence – 2 % men and 3 % women
- Majority women > 55 yrs

1854 - Paget (Described CTS)
1880 - Putnam (Series of 30 patients)
1933 - Sir James Learmonth (Carpel Tunnel decompression)
Pressure-Perfusion Relation

30-40 mm Hg
- Axonal Transport impaired
- Paresthesias & Neurophysiologic changes

50 mm Hg
- Axonal Block

60 mm Hg
- Complete Intra-neural ischemia
- Sensory & Motor block
### Possible Entrapment Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Possible Entrapment Sites</th>
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<tbody>
<tr>
<td>Arm</td>
<td>- Struther’s ligament/Supracondylar process humerus</td>
</tr>
<tr>
<td></td>
<td>- Lacertus fibrosus (Bicipital aponeurosis)</td>
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<tr>
<td>Forearm</td>
<td>- Pronator Teres</td>
</tr>
<tr>
<td></td>
<td>- Between 2 heads</td>
</tr>
<tr>
<td>Hand</td>
<td>- Flexor Digitorum superficialis</td>
</tr>
<tr>
<td></td>
<td>- Carpel Tunnel</td>
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</tbody>
</table>
Clinical Findings

• Nocturnal Pain – Burning (? Venous stasis)

• Numbness

• Tingling

• Aggravates with strenuous activity

• To relieve the symptoms, patients often “flick” their wrist as if shaking down a thermometer (flick sign).
Systemic Review

• Third Trimester – Pregnancy

• Renal Failure/ Dialysis

• Rheumatoid arthritis

• Hypothyroidism

• Acromegaly

• Amyloidosis
Examination

• Phalen’s maneuver

• Tinel’s sign

• Pressure provocation test (Durkan’s) – {Most specific and sensitive (85-99%)}

• Weak thumb abduction

• Two-point discrimination/Vibration testing
Phalen Sign –
Sensitivity 40-86%
Specificity 48-54 %

Tinel Sign –
Sensitivity 45-75%
Specificity 40-67 %
Differential Diagnosis

- C6, C7 radiculopathy
- Thoracic outlet syndrome
- Proximal median nerve entrapment
- Traumatic injury at the level of the wrist
  - handcuff neuropathy

- Double crush syndrome
  - Upton, McComas (Lancet 1973)
  - 81/115 patients with median/ulnar nerve sx also had cervical nerve root lesion
Diagnostic Evaluation

• History
• Physical examination
• Imaging – USG/CT/MRI
• NCV
Electro-diagnosis

• Palmar Sensory latency – Most sensitive

• SNAP’s – Low amp / unrecordable

• EMG – APB/OP

✓ Spontaneous fibrillation
✓ Positive sharp waves
✓ Long duration, polyphasic MUP’s
Electrophysiological Grading - CTS

Mild
- SNAP or Mixed NAP – prolonged
- Low amp. SNAPs

Moderate
- Mild CTS + Prolongation of median motor distal latency

Severe
- Median motor + sensory distal latency prolonged
- Absent SNAPs or mixed NAPs
- Reduced thenar compound MAPs
- Fibrillation, reduced recruitment
Imaging - USG

• Entrapped nerve –
  ✓ Hypoechoic
  ✓ Swollen
  ✓ Flattened

• Highly sensitive and specific
• Role in clinico-electrodiagnostic dilemma
Management

• CONSERVATIVE TREATMENTS
  - General measures
  - Wrist splints (Full time - optimal)
  - Oral Meds (Steroids > NSAIDs)
  - Local Injection of steroids (Transient)
  - USG therapy (Beneficial in long term)
  - Laser therapy (variable results)
  - Exercise therapy & Pyridoxine -- Ineffective

• SURGERY – Better results
Surgical Technique – Open Incision
Endoscopic Carpel Tunnel Release – Single port
3M Agee Carpal Tunnel Release System components. A, synovial separator; B, hamate finders video endoscope; C, disposable blade assembly; D, scope protection sleeve; E, light post adapter, Storz type; F, light post adapter, Wolf type; G, hand piece with trigger; H, eyepiece endoscope; I, V-mount adapters; J, video endoscope
## Cochrane Database – 33 studies

<table>
<thead>
<tr>
<th>Variable</th>
<th>OCTR</th>
<th>ECTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Return to daily work</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Transient Nerve dysfunction</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Wound Infection</td>
<td>More</td>
<td>Less</td>
</tr>
<tr>
<td>RR of needing revision Sx</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Pain Score, Functional Status (Initial)</td>
<td>Less favorable</td>
<td>More favorable</td>
</tr>
<tr>
<td>Pain Score, Functional Status (8-12 weeks)</td>
<td>Same</td>
<td>Same</td>
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Bilateral CTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Simultaneous</th>
<th>Staged</th>
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</thead>
<tbody>
<tr>
<td>Total disability time</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Surgical Cost</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Self care</td>
<td>Compromised</td>
<td>Preserved</td>
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Our Department’s Contribution

• Early vs Delayed Endoscopic CTR: Prospective randomized study

World Neurosurgery, Sept – 2012; Chandra PS, Singh PK, Tripathi M et al

✓ N 100 patients – 51 early Sx (< 1 week) & 49 delayed Sx (> 6 months)
✓ Moderately severe CTS
✓ Improvement significant in both groups (p < 0.001)
✓ Comparative analysis revealed – Early decompression better (p < 0.001)
Thank You