Recurrent Neurogenic TOS: The Role of Pectoralis Minor Syndrome

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November 16, 2018
Veith Symposium

Epidemiology

• Persistent Neurogenic TOS:
  – 10-15% patients
  – failure to show any improvement

• Recurrent Neurogenic TOS:
  – 15-30% patients after partial or complete symptomatic relief
    • Insidious and gradual
    • Acute, precipitated by accident
  – 2-80 months after decompression
    • 80% occur by 2 years

Etiology: old or new?

• Missed diagnoses:
  - Cervical spine disease
  - Spinal stenosis
  - Nerve root compression
  - Rotator cuff tear
  - Fibromyalgia
  - Complex regional pain syndrome
  - Peripheral nerve compression
  - Somatoform disorders
  - Cuboid tunnel syndrome
  - New stretch injury to plexus
  - Incomplete first or cervical rib resection
  - Ectopic fibrous bands
  - Scar tissue formation around brachial plexus
  - Pectoralis minor syndrome

Pectoralis Minor Syndrome

• Frequent cause recurrent and persistent neurogenic symptoms
• Coexistence NTOS occurs >50% of patients
• Sanders recognized in 2003, PMS causes the majority (>75%) of recurrent nTOS symptoms

  ➢ Patients with recurrent or persistent NTOS should be evaluated for PMS

• Infraclavicular neurovascular bundle compression
• Originates ribs 2-5, inserts on coracoid process of scapula
• Muscle hypertrophy, spasm and tissue fibrosis

Disclosures

• None
Pectoralis Minor Syndrome

- 1945, first described by Wright
- 1956, Lord and Stone reported 5 patients that underwent pec minor division for "hyperabduction syndrome"
- 1998, rediscovered- George Thomas
- 2004, studied- Richard Sanders
  - subset of neurogenic TOS- paresthesias, pain and/or weakness
  - compression of the neurovascular bundle by the pectoralis minor muscle
  - exist as an isolated condition or in combination with TOS

Pectoralis Minor Syndrome

- Etiology:
  - 64% trauma-MVA
  - 18% repetitive shoulder strain
  - 18% spontaneous
  - Hyperabduction of shoulder

- NTOS & PMS- symptoms are similar:
  1) Weakness- upper extremity
  2) Pain- neck, clavicular, anterior chest wall, trapezius or axillary
  3) Paresthesia- arm and hand

- Isolated PMS:
  - Fewer head and neck symptoms, less intense symptoms
  - 85% PMS continue to work vs. 57% PMS/NTOS

Physical Examination

- Sanders 2007- 3 positive findings of PMS:
  1) tenderness to palpation in the subcoracoid space
  2) positive response upper limb tension test (ULTT)
  3) positive response elevated arm stress test (EAST)

- Patients with recurrent symptoms after NTOS decompression
  - PM tenderness may have been overlooked

Physical Examination

- Standard TOS exam-
  - Provocative maneuvers- lack vigorous response
    - Investigate nerve compression at all levels
    - Isolated PMS-
      - Fewer head and neck positive exam findings
      - Neck rotation, head lift, scalene compression- negative
      - Tenderness ant/axilla/chest wall below clavicle
      - Arm symptoms with palpation of subcoracoid space
      - Resolves contraction of pec major muscle

Diagnosis

- Thorough history & physical exam
  - No diagnostic test or exam finding is pathognomonic for NTOS/PMS
  - Imaging neck, chest, shoulder- rule out other pathology
  - Selective pec minor muscle block (not plexus block)
  - Selective scalene muscle block
  - Electro diagnostic testing- EMG/NC velocity test
    - Often normal for PMS
    - Median antibrachial sensory cutaneous nerve, more sensitive PMS/NTOS
Prior to injection, baseline exam is performed:
- Inject 4 cc of 1% lidocaine into the PM muscle 3 cm below clavicle (ultrasound guided, 14-7 MHz transducer)
- 45 degree angle avoids entering the pleural space
- Diffusely infiltrate in 2-3 cm area at the point of maximal tenderness
  - Successful block - resolution of tenderness, improvement of symptoms at rest and with provocative maneuvers
  - Unsuccessful - perform scalene block

Diagnosis: Pec Minor Muscle Block

Failure of conservative therapy
- ROM, stretching exercises
- Pect minor, neck, shoulder - 8 weeks

PM Tenotomy:
- Low risk outpatient procedure
- Recovery time - few days
- Various approaches: transax, infraclavicular, ant axillary line, clavopectoral

Diagnostics 2017
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PM Tenotomy Results

- Ambrad-Chalea:
  - 17 patients recurrent NTOS/PMIS
  - 13 tenotomy, 14 neurectomy
  - 100% improvement

- Venturi:
  - 57 PMIS with tenotomy
  - All scores improved by 3 months
  - DASH, TOS disability scores & cervical brachial symptom questionnaire

- Sanders:
  - 52 isolated tenotomy, 3 year follow-up
  - PMT alone 90% good-excellent
  - Combined 35% good-excellent

- Lum:
  - 27 PMIS with tenotomy
  - PMT alone 92% success
  - Combined 51% success
Conclusion

- Pectoralis minor syndrome is a frequent cause of recurrent or persistent neurogenic TOS symptoms
- Isolated PMS tends to have fewer head and neck symptoms
- Diagnosis is aided by performing a pectoralis minor muscle block
- Pectoralis minor tenotomy appears to be safe and effective