Learning Objectives:
- Conduct initial examination and classify patients with TMD.
- Determine plan of care for patients with TMD.
- Perform manual therapy for soft-tissue and joint restrictions.
- Provide patient education for self-management.

Examination

- History:
  - Chief complaint
  - Onset, mechanism of injury
  - Pain behavior patterns
  - Red flag screening
  - Medical interventions
  - Occupation
  - Activities of daily living
  - Recreational activities

Examination

- Specific Questions:
  - Pain when talking, singing, yawning or chewing?
  - Problems opening or closing your mouth?
  - Clicking, popping or gravel noises in the jaw?
  - The feeling that your jaw catches or locks?
  - The habit of grinding or clenching your teeth?
  - A recent change in your bite?
  - Splint or night guard?
  - Dental history, including orthodontics?
  - Ear symptoms?

Examination

- Specific Questions (cont’d)
  - Symptoms change (better or worse) with neck movements?
  - Headaches? If yes, where do they start?
  - Neck, shoulder, or back pain?
  - Whiplash or recent injury to your head or neck?
  - Increased stress in your life?
  - A history of arthritis or other medical conditions?
  - Any prescription or over-the-counter medications, herbs, or supplements?

Examination

- Functional Questionnaires:
  - Jaw Functional Limitation Scale
    - Ohrbach et al, 2008
    - 20 item version with good reliability and validity for assessing limitations in mastication, jaw mobility, verbal and emotional expression
  - Temporomandibular Disorder Disability Index
    - Streigerwald and Maher, 1997
    - No psychometrics available
Examination

- Screening Questionnaires (Harrison, 2014)
  - PHQ-4
    - Kroenke, 2009
    - Depression and anxiety
  - Graded Chronic Pain Scale
    - Von Korff, 1992
    - 7 questions, 0-10 scale
    - Pain and disability

Examination

- What is the patient’s goal or expectation?

Checklist of Psychological and Behavioral Factors From McNeill 1990 in Dutton 2004

- Inconsistent, inappropriate, or vague reports of pain
- Over dramatization of symptoms
- Symptoms that vary with life events
- Significant pain of > 6 months’ duration
- Repeated failures with conventional therapies
- Inconsistent response to medications
- History of other stress-related disorders
- Major life events (e.g. new job, marriage, divorce, death)
- Evidence of drug abuse
- Clinically significant anxiety or depression
- Evidence of secondary gain

Examination: Posture

- Sitting and/or standing alignment
  - Occipital protuberance aligned with C7
  - 2 finger-widths of space between base of occiput and C2
  - McGregor’s plane is horizontal
  - Forehead, lips and chin aligned (orthognathic)
    - Retroganathic-posterior
    - Prognathic-anterior

Examination: Posture

- Forward head posture is common
  - Adaptive: greater mandibular depression
  - Maladaptive: functional malocclusion and spasm of the lateral pterygoid

Examination

- Facial symmetry
  - Bottom 1/3 of face = top 1/3 of face
  - Masseter hypertrophy or atrophy
Examination

- Facial symmetry
  - Lat. eye-mouth = nose-chin
  - Alignment of central incisors

Examination: AROM

- Cervical
  - Examine c-spine gross and accessory mobility prior to TMJ
  - Can the patient keep the mouth closed during maximum flexion and extension?
    - During cervical flexion: mandible moves up and forward
    - During cervical extension: mandible moves down and back

Examination

- Mandible AROM
  - Depression-normal opening
    - 3 Fingers
      - 40-50 mm
  - Lateral excursion
    - 8-11 mm
  - Protrusion
    - 4-6 mm past upper incisors
      - (8-10 mm total)

Examination: AROM

- Reliability (ICC)
  - Standard Ruler: Magee 2008
    - Depression
      - Intra-rater reliability .94
      - Inter-rater reliability of .99
    - Lateral deviation
      - Intra-rater reliability .75-.92
      - Inter-rater reliability of .94-.96
    - Protrusion
      - Intra-rater reliability .89-.93
      - Inter-rater reliability of .98

Examination: AROM

- Mandible AROM
  1. Observe
  2. Palpate
  3. Measure

  Draw opening/closing pattern. Use "x" to mark joint sounds and "\" to mark end range

Examination: AROM

- Palpate condylar movement
  - Anterior to tragus over condyle
  - Posterior to tragus behind condyle
  - 2-4# pressure used to palpate for tenderness
    - Sn 0.92, Sp 0.96 for joint pain
Examination: AROM

- Auscultation
  - Click, pop, crepitus
  - \( k = 0.85 \)
  - Document when it occurs
  - Painful or not

Examination: PROM

- Maximum Assisted Opening
  - PT uses thumb on maxillary incisors and index finger on mandibular incisors to assist with moderate pressure.

Examination: Strength

- MMT
  - Qualifiers:
    - Strong/pain free
    - Strong/painful
    - Weak/pain free
    - Weak/painful

Examination

- Overpressure (end feel)
  - Normal: tissue stretch
  - Abnormal
    - Hard: osseous abnormalities
    - Springy: displacement of the disc
    - Capsular: adaptive shortening of the periarticular tissues

Examination: Accessory Motions

- TMJ accessory motions
  - Distraction (inferior, caudal)
  - Anterior glides
  - Medial and lateral glides

Examination: Palpation

- Muscle Palpation:
  - 2-4# pressure for extra-oral, 1# for intra-oral
  - Mandible in rest position without teeth contact
  - Press in multiple areas to locate tenderness
  - Note:
    - Hypertonus
    - Local tenderness: 0-4 scale
      - 0 no pain
      - 1-4 withdrawal from touch
    - Referred pain
Examination: Palpation

- Temporalis
  - Posterior
  - Middle
  - Anterior

- Temporalis tendon-intraoral along ramus of mandible
  - Use index finger pad

- Masseter
  - Origin
  - Body
  - Insertion

- Medial Pterygoid

- Lateral Pterygoid

- Accessory Muscles
  - SCM, Scalenes, Suboccipitals
  - Hyoid bone mobility (infrahyoids)
  - Ant. Digastrics
Examination: Special Tests

- Jaw reflex: tap examiner's thumb
- Chvostek Test: tap parotid gland overlying masseter.
  - Positive test: facial muscles twitch. Implicates involvement of CN VII.

Examination: Special Tests

- Bite Test: place cotton roll or double tongue blades between molars and bite gradually; assess pain
  - Ipsilateral pain—muscle/tendon irritation
  - Contralateral pain—capsulitis/synovitis
  - Test both sides to confirm

Diagnostic Value of Orthopedic Tests in TMD Lobbezoo-Scholte 1993

- Tests Used
  1. Active movement (all directions)
  2. Passive opening
  3. Joint Play
  4. Compression (manual)
  5. Static pain test (MMT)
  6. Palpation (muscles)

Diagnostic Value of Orthopedic Tests in TMD Lobbezoo-Scholte 1993

- Distinguish Patient or Control
  - Passive opening (OR 20.6)
  - Active movements and palpation (OR 35.6)
- Distinguish Myogenous or Arthrogenous Patients
  - Active movements (OR 15.36)
- Distinguish Internal Derangement or Osteoarthritis
  - Active movements (OR 80.0)
- Distinguish ID w/ Reduction or w/o Reduction
  - Active movements (OR 288.00)

Evaluation

- PT Diagnosis (from Home Study Course)
  - TMD Classification (Olson 2009)
    - Capsulitis/synovitis
    - Capsular fibrosis
    - Masticatory muscle disorders
    - Hypermobility
    - Anterior disc displacement with reduction
    - Anterior disc displacement without reduction
    - Osteoarthritis

Research Diagnostic Criteria Dworkin and LeResche 1992

- Axis I: Clinical TMD Conditions
  - Group I: Muscle disorders
    - I.a. Myofascial Pain
    - I.b. Myofascial Pain with Limited Opening (<40 mm)
  - Group II: Disc Displacements
    - II.a. With reduction, normal opening
    - II.b. Without reduction, limited opening
    - II.c. Without reduction, normal opening
  - Group III: Joint
    - III.a. Arthralgia-capsulitis/synovitis
    - III.b. Osteoarthritic-articular and crepitus
    - III.c. Osteoarthritis-abSENCE OF ARTHRALGIA WITH BONY CHANGES
A Proposed Diagnostic Classification of Patients With Temporomandibular Disorders: Implications for Physical Therapists

**Evaluation: DC/TMD**

- Refer out
  - Primary HA (migraine, cluster)
  - Secondary HA: outside scope of PT
  - Cranial neuralgias
  - CNS lesions
  - Major psychological disorders
  - Central sensitization

**Evaluation: DC/TMD**

- TMJ Disorder
  - Arthralgia
  - DDWR
  - DDWOR
  - Capsular adhesions
  - OA

**Evaluation: DC/TMD**

- Arthralgia
  - Preauricular pain with
    - Joint palpation
    - End range movements
    - Power stroke (firm bite)

**Evaluation: DC/TMD**

- Disc Displacement With Reduction
  - Opening and closing clicks during 1 or 3 reps
    OR
  - Opening or closing clicks during 1-3 reps and click with 1 of 3 lateral excursions or protrusion.
Evaluation

Disc Displacement With Reduction
- Stage I:
  - Disc slightly anterior, little to no pain.
  - Repetitive trauma begins to deform disc.
- Stage II:
  - Reciprocal click early in opening and late in closing phase.
  - Loss of integrity of ligamentous and intracapsular structures, disc deformation and impingement
  - May develop open lock

Repetitive trauma begins to deform disc.

Evaluation: DC/TMD

Disc Displacement Without Reduction
- Hx of jaw locking or catching
- No current joint clicks or pops
- ROM opening ≤40 mm

Capsular Adhesions (single joint)
- Mouth opening < 40 mm
- Limited contralateral lateral excursion
- Protrusion with deflection toward affected side

Evaluation: DC/TMD

Osteoarthritis
- Arthralgia
- Crepitus

Evaluation

Osteoarthritis
- Stage V
  - Radiographic degenerative changes on condylar head and articular eminences
  - Evidence of remodeling and osteophytes
  - Marked deformity and thickening of disc
  - Narrowed joint space
Evaluation: DC/TMD

- **Masticatory Muscle Disorder**
  - Masseter and/or temporalis
    - Palpation reproduces chief complaint
    - Pain at end range of mouth opening
    - MMO may be limited to ≤ 40 mm
      (Confirming if lateral excursion and protrusion are not painful or limited)

Evaluation: DC/TMD

- **Masticatory Muscle Disorder**
  - Lateral Pterygoid
    - Lateral face pain is chief complaint
    - Pain reproduced with resisted protrusion
    - Pain with power stroke or bilateral bite
      (Confirming if end-range mouth opening does not reproduce complaint)

Evaluation: DC/TMD

- **Cervicogenic HA**
  - Reproduction of chief complaint with cervical exam
    - Segmental dysfunction
    - Trigger point referral
    - Nerve root irritation

Interventions

- **Education**
  - Rest Position of Jaw and Neck
    - Tongue tip on top (rugae)
    - Lips closed
    - Teeth parted
    - Erect posture
    - Diaphragmatic breathing
  - Cervical Posture
    - Sleep: supine preferred
    - Work/school/ADLs

Education

- **Eating Modifications**
  - Soft foods include:
    - Scrambled eggs
    - Quiche
    - Baked fish
    - Yogurt
    - Tofu
    - Mashed potatoes
    - Pasta
    - Soup
    - Smoothies
    - Milkshakes
    - Ice cream
    - Applesauce
    - Bananas
    - Gelatin
  - Don’t bite into foods such as:
    - Whole apples
    - Carrots or celery
    - Corn on the cob
    - Sandwiches with lettuce
    - Hamburgers
  - Cut foods into bite-sized pieces
  - Grind or finely chop meats or other tough foods
Education

- Eating Modifications
  - Avoid hard or chewy foods:
    - Nuts
    - Popcorn
    - Gum
    - Carmel
    - Gummy candies
    - Bread crusts or bagels
    - Ice

- Other Modifications
  - Support your jaw when yawning
    - “Tongue tip on top”
    - Manual support
  - Avoid loud singing or yelling
  - Avoid biting nails or pencils
  - For desk workers:
    - Headset
    - Computer monitor at eye level
    - Sit with good back support and don’t slouch

Interventions: Manual Therapy

- Soft tissue techniques
  - Massage – longitudinal, cross friction or circular

  SCM/Scalenes  Submandibular  Pterygoids/Masseter

- Myofascial Release – take up the slack and hold (1-2 min)
  - Occipital
  - Parietal/Temporals
  - Masseter-elevation
  - Masseter-depression

- Joint mobilization
  - Distraction-for pain control, general joint mobility or reduce condylar head if it is displaced
  - Distraction and anterior translation-improve opening and protrusion or reduce an anteriorly displaced disc

Interventions: Manual Therapy

- Ear Pull

Interventions: Manual Therapy
Interventions: Manual Therapy

- **Joint mobilization**
  - Lateral/Medial glides-prep joint for ROM activities, break adhesions, stretch joint capsule or improve lateral deviation.
  - Lateral-thumb on molars (lingual side), fingers on mandible near front teeth
  - Medial-thumb near front teeth (lingual side), fingers on posterior mandible

Interventions: Mobility Exercises

- **TMJ rotation and translation control**
  - Restore proper tracking to the TMJ
  - Decrease or eliminate clicking, popping or excessive movement
  - Emphasize rotation
    - Phase I: Active assisted-finger on chin and TMJ, tongue on top
    - Phase II: Active-fingers on TMJ, tongue on top
    - Phase III: Fingers in Phase I position, drop tongue at max opening
    - Phase IV: Fingers in Phase II position, drop tongue at max opening

Mobility: TMJ rotation and translation control “Turn the knob and open the door”

- **Controlled ROM with Tongue Blade**
  - Requires visual cues with mirror
  - Muscle re-ed and AROM post-op
  - Initial training with tongue blade and progress to without
    - Straight opening
    - Lateral deviation
    - Protrusion

Interventions: Mobility Exercises

- **PROM**
  - Finger assisted method

Interventions: Mobility Exercises

- **PROM**
  - Therabite
    - Atosmedical.com
Interventions: Stability Exercises

- Phase I: one finger resistance in rest position
  - Lateral R and L, up, in, diagonal R and L

- Phase II: one finger resistance with opening one knuckle width

- Phase III (opt): one finger resistance with opening two knuckles wide

Rhythmic Stabilization:
- Resist depression/elevation in neutral
  - Progress to one knuckle width

Rocabado 6x6 Program
- 6 exercises, 6 reps, 6x/day
  1. Tongue Clucks
     Promotes correct rest position
  2. Controlled TMJ Rotation on Opening
     Promotes rotation and prevents excessive protrusion
  3. Mandibular Rhythmic Stabilization
     Promotes normal position of jaw with proper postural alignment

Rocabado 6x6 Program
- 4. Upper Cervical Distraction
  Relieve neurovascular compression by distracting occiput from atlas
- 5. Axial Extension of Cervical Spine
  Normalize posture
- 6. Shoulder Girdle Retraction & Depression
  Normalize posture

Impairments: Posture-related
- Education
- Soft-tissue mobilization
- Posture exercises
  (Wright, et al 2000)
- Myofacial classification (>6 mos)
- 3 visits
- Signif. improvement in MMO, Sx severity, PPT, perceived improvement
Impairments: Cervical Muscle Endurance

- **Flexors** (Armijo-Olivo, et al. 2010)
- **Extensors** (Armijo-Olivo, et al. 2012)

Interventions: Modalities

- **Home:** heat and/or cold, TENS
- **Clinic**
  - US
  - E-stim: IFC, iontophoresis
  - Spray and Stretch
  - EMG biofeedback
  - Low Level Laser

Interventions: Modalities

- TENS electrode placements

Post-operative Considerations

- Arthrocentesis
- Arthroscopy
- Arthroplasty with or without Autograft
- Partial or Complete Joint Replacement

Interventions: Modalities

- **Occlusal Splints**
  - Common intervention used by dentists
  - Short-term benefit 70-90%
  - Goals:
    - Create single contact for all posterior teeth
    - Decrease bite force
    - Decrease muscle activity
  - Evidence does not support general use for nonacute TMD, bruxism and headaches

Occlusal Splints

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Effects of 4 Rx Strategies for TMJ Closed Lock  Schiffman et al, 2014

<table>
<thead>
<tr>
<th>Medical Management</th>
<th>Rehabilitation</th>
<th>Arthroscopy w/ Rehabilitation</th>
<th>Arthroplasty w/ Rehabilitation</th>
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</thead>
<tbody>
<tr>
<td>Education</td>
<td>Rehab team (dentist, PT, psychologist)</td>
<td>Lysis of intracapsular adhesions, irrigation, betamethasone injection, manual movement of mandible</td>
<td>Open joint with discectomy or discectomy with joint debridement as needed</td>
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<tr>
<td>Optimistic counsel</td>
<td>Counseling programs</td>
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<tr>
<td>Self-help program</td>
<td>6 day oral steroids</td>
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<td>NSAIDS – 6 wks</td>
<td>PRN- mm relax.</td>
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<tr>
<td>OTC analgesics</td>
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</tbody>
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Outcome Measures Recommended by IAOMS

- Pain absent or so mild that it does not concern the patient; pain is significantly reduced in intensity and frequency
- Mandibular ROM > 35 mm opening and 6 mm lateral and protrusive
- Absence or reduction of TMJ sounds
- Regular diet that, at worst, avoids tough or hard foods-patient minimally inconvenienced by diet
- Return of normal imaging appearance of TMJ or stabilization of degenerative changes
- Absence of significant complications
- Absence of symptoms for at least 2 years

Effects of 4 Rx Strategies for TMJ Closed Lock  Schiffman et al, 2014

- Follow up at 3, 6, 12, 18, 24 and 6 months
- Most IAOMS improved significantly over time ($P<0.0003$)
- No difference between Rx strategies relative to any Rx outcome at any follow-up ($P>0.16$)
- Non-surgical treatment should be employed for TMJ closed lock before considering surgery.

Temporomandibular Disorders

Are there any questions?

Let's go to lab!