Orofacial Pain Disorders: The Restorative Dentist’s Dilemma

Matthew R. Lark D.D.S.

A clinicians guide to conditions affecting oromandibular range of motion
Range of Motion Disorders: The Restorative Dentist’s Dilemma

When patients present with range of motion problems, it is the restorative dentist’s charge to assess the presenting signs and symptoms, and to formulate a differential diagnosis. Establishing the diagnosis requires data gathering, testing, and necessary imaging in order to determine the origin of the restriction. An accurate diagnosis is vital so appropriate treatment modalities can be administered to manage the disorder.

Introduction

During the course of restorative dental treatment, a patient may develop a temporomandibular disorder which decreases their range of motion. The patient may not be able to open wide due to pain or tightness. These conditions can pose a problem for the restorative dentist and patient by causing pain, suffering, a decrease in quality of life, and an almost certain delay in accomplishing the restorative treatment. There are a myriad of conditions which can cause a decrease in range of jaw movements.

Mandibular movement was described by Posselt as the envelope of motion as described by the border movements of the jaw in three dimensions. The envelope of function defines a unique normal functional range of movement required to partake in the activities of daily living. Chewing, speaking, singing, respiration, and other oral activities fall within the normal range of the envelope of function. Healthy function of the oromandibular system requires proper function of the temporomandibular joints, the muscles of mastication, an intact neurosensory function and myotactic reflex. Disease conditions and temporomandibular disorders can impede function of the oromandibular system and alter the range of motion.

Ranges of motion problems are complex. Frequently when a patient is experiencing a problem opening the jaw, there are multiple disorders underlying the decrease in function. Classifications of disorders which can affect jaw function are: myogenous, arthrogenous, trauma, odontogenic, medical, or systemic diseases. The central and autonomic nervous systems also play a role in the control of jaw movement. Conditions such as, neuropathic pain, neuralgia, an autonomic nervous system up-regulated by stress or a lack of restorative sleep, and neurologic disease can influence the range of motion of the jaw.

This handout will discuss some of the conditions which affect the range of motion of the oromandibular system. The goal is to offer the restorative dentist a guide to differentially diagnose a suffering patient’s condition and to aid in formulating a management strategy to ameliorate the disorder and to improve function. A better understanding of the underlying etiology will enable the dentist to better diagnose...
the condition and prevent unnecessary treatment. Diagnosis is a thinking doctor's game. There can be many elements at play in every case and often multiple diagnoses in the individual patient. Sorting out the presenting signs and symptoms can be a tremendous challenge, even for the experienced clinician.

The epidemiology for TMD related range of motion problems shows a greater preponderance of occurrence in females. Hormonal regulation, gender, and phenotype differences are responsible for differences in susceptibility of temporomandibular disorders. Fluctuating estrogen levels alter the brain’s ability to suppress pain. Excess estrogen also depresses the rate of collagen synthesis in tendons and ligaments, thus decreasing their tensile strength which increases the susceptibility to tearing and injury. The psycho-social dynamic must also be considered when investigating a problem list. The stress of modern living may be driving the up-regulation of the sympathetic nervous system and dampening the effect of nociceptive inhibition.

<table>
<thead>
<tr>
<th>Social and Psychological History- Stress factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Increased Parafunction</td>
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<tr>
<td>- Anger – “Release the Fist in your Face”</td>
</tr>
<tr>
<td>- Depression and Chronic Pain</td>
</tr>
<tr>
<td>- “Brain under Siege” - Tanenbaum</td>
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<tr>
<td>- Women 8:1</td>
</tr>
</tbody>
</table>

So it is time to “put down the handpeice” and begin to collect the data necessary to formulate the diagnoses which can help resolve the presenting problem. The quest toward answers starts with a complete history of the chief complaints. The goal for treating these conditions should be management based, not curative. Improvements in the range of motion and decreasing VAS pain scores and controlling the etiologic agents is a realistic goal. Some of these conditions are chronic and multifaceted or may have a deep seated psycho-emotional backdrop. Other conditions may have transitioned into a centrally maintained pain syndrome.

Patients will have to participate in their own care in order to facilitate improvements in their activities of daily living. It is important that the dental treatment plan be delayed until an adequate resolution of the range of motion disorder.
Data Gathering

When a patient presents with a problem with jaw opening it is imperative to gather the data required to develop a working diagnosis. The list includes:

- TMD orofacial pain patient questionnaire
- Medical and dental history
- Chief complaints: listed in order of severity
- History of present condition
- Visual Analogue Scale (VAS) pain score
  0 ——————————— 10
  No pain maximum pain
- Onset, timing, and precipitating factors
- Duration, quality, and nature of pain
- Recent surgeries, illnesses, medications, and medical conditions
- Signs and symptoms: mild, moderate, or severe
- Pain and dysfunction map
After carefully reviewing the history, the clinician begins narrowing the scope of the working diagnosis. The exam is symptom directed by the areas of interest delineated by the history and interview. A thoughtful review of the history will often lead to a preliminary diagnosis. The examination confirms and elucidates the working diagnosis through the process of exclusion of certain elements and inclusion of others. The components of diagnosis are interwoven and must be assembled like the pieces of a puzzle. Multiple diagnoses may exist in the same individual. For example, a patient determined to have an anterior displaced disc without reduction will commonly have an accompanying local myalgia and synovitis.
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Toledo, OH 43623  
419-824-7900  

PATIENT QUESTIONNAIRE

<table>
<thead>
<tr>
<th>Name:</th>
<th>LAST NAME</th>
<th>FIRST NAME</th>
<th>MI</th>
<th>MR</th>
<th>MRS</th>
<th>DR</th>
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</thead>
<tbody>
<tr>
<td>I prefer to be called:</td>
<td>☐ Male</td>
<td>☐ Female</td>
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<td>Birthdate:</td>
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<td>Age: SS #:</td>
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<td>Home Address:</td>
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<td>☐ Single</td>
<td>☐ Married</td>
<td>☐ Divorced</td>
<td>☐ Widowed</td>
<td>☐ Separated</td>
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<td>Home #:</td>
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<td>WK #:</td>
<td>Ext. DL #:</td>
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<td>Employer:</td>
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<td>Employer’s Address:</td>
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<td>How long there? Occupation:</td>
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<td>Where &amp; when are best times to reach you?</td>
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<td>Who may we thank for referring you?</td>
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<td>Other family members seen by us:</td>
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<tr>
<td>Previous / Present Dentist:</td>
<td>(Please check)</td>
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<td>Last Visit Date:</td>
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</tbody>
</table>

Have you contacted your insurance company as to whether there is coverage in your contract for this type of a problem?  

Patients who carry health insurance should remember that professional services are rendered and charged to the patient and not the insurance company. Insured patients are expected to take care of the fees as services are rendered unless other arrangements are made in advance. Even though an insurance claim is filed, you will receive a statement each month if your account has a balance due. This office cannot accept responsibility for collecting your insurance claim or negotiating a settlement on a disputed claim. You are responsible for payment of your account within limits of our credit policy. If you have any questions we will, of course, assist you. Your eventual reimbursement will be determined by your insurance carrier.  

I understand that I am financially responsible for all costs of dental/medical treatment.  

Signature of responsible party:  

Date:  

Essayist: American Academy of Restorative Dentistry 2/26/2012  
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MEDICAL INSURANCE
Primary Medical Insurance

Insurance Co. Name:

Insurance Co. Address:

Insurance Co. Phone #:

Group # (Plan, Local or Policy #):

Insured’s Name: ___________________________ Relation: ___________________________

Insured’s Birthday: __/____/_____ Insured’s SS #: ___________________________

Insured’s Employer: ___________________________

Secondary Medical Insurance

Insurance Co. Name:

Insurance Co. Address:

Insurance Co. Phone #:

Group # (Plan, Local or Policy #):

Insured’s Name: ___________________________ Relation: ___________________________

Insured’s Birthday: __/____/_____ Insured’s SS #: ___________________________

Insured’s Employer: ___________________________

In the event of an emergency, is there someone who lives near you that we should contact?

Their Name: ___________________________ Relation: ___________________________

WK #: ___________________________ HM #: ___________________________

DENTAL INSURANCE
Primary Dental Insurance

Insurance Co. Name:

Insurance Co. Address:

Insurance Co. Phone #:

Group # (Plan, Local or Policy #):

Insured’s Name: ___________________________ Relation: ___________________________

Insured’s Birthday: __/____/_____ Insured’s SS #: ___________________________

Insured’s Employer: ___________________________

Secondary Dental Insurance

Insurance Co. Name:

Insurance Co. Address:

Insurance Co. Phone #:

Group # (Plan, Local or Policy #):

Insured’s Name: ___________________________ Relation: ___________________________

Insured’s Birthday: __/____/_____ Insured’s SS #: ___________________________

Insured’s Employer: ___________________________

In the event of an emergency, is there someone who lives near you that we should contact?

Their Name: ___________________________ Relation: ___________________________

WK #: ___________________________ HM #: ___________________________

WHAT ARE THE CHIEF COMPLAINTS FOR WHICH YOU ARE SEEKING TREATMENT?

1. ___________________________
2. ___________________________
3. ___________________________
4. ___________________________
5. ___________________________
6. ___________________________

WHEN DID YOUR PROBLEM FIRST OCCUR?

WHAT MAKES YOUR PAIN WORSE?

LIST ANY MEDICATIONS CURRENTLY BEING TAKEN:

1. ___________________________
2. ___________________________
3. ___________________________
4. ___________________________
5. ___________________________
6. ___________________________

WHAT TREATMENTS HAVE YOU HAD FOR THIS PROBLEM?

Practitioner Name: ___________________________ Specialty: ___________________________ Treatment: ___________________________

Practitioner Name: ___________________________ Specialty: ___________________________ Treatment: ___________________________

Practitioner Name: ___________________________ Specialty: ___________________________ Treatment: ___________________________

WHAT OTHER INFORMATION IS IMPORTANT TO YOUR CONDITION?

HAVE YOU EVER HAD X-RAYS TAKEN OF YOUR JAW JOINTS? ___________________________

(If yes, please bring them to the office for your appointment)

TYPE OF X-RAYS TAKEN? ___________________________

DATE TAKEN:

YES NO

______ ___________ Do you wear, or have you ever worn a splint, bite plate, or appliance?

______ ___________ Have you ever been treated for a bad bite?

______ ___________ Have you ever had orthodontic treatment?

______ ___________ Do you have extensive dental crowns and bridges?
<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have missing back teeth?</td>
<td></td>
</tr>
<tr>
<td>Do you wear a removable partial denture?</td>
<td></td>
</tr>
<tr>
<td>Have you ever been treated for problems of your jaw joints or facial muscle spasms?</td>
<td></td>
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<tr>
<td>Do you ever awaken with an awareness of your teeth or jaws?</td>
<td></td>
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<tr>
<td>Are you aware of clenching your teeth during the day?</td>
<td></td>
</tr>
<tr>
<td>Have you ever been told that you grind your teeth in your sleep?</td>
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</tr>
<tr>
<td>Do your teeth hurt from biting?</td>
<td></td>
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<tr>
<td>Do you have any pain or soreness around your eyes, ears, or other parts of your body?</td>
<td></td>
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<tr>
<td>Do you have difficulty hearing?</td>
<td></td>
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<tr>
<td>Do you have tension headaches?</td>
<td></td>
</tr>
<tr>
<td>Do you have occasional headaches?</td>
<td></td>
</tr>
<tr>
<td>Do you have migraine headaches?</td>
<td></td>
</tr>
<tr>
<td>Do you frequently have stiff neck muscles or neckaches?</td>
<td></td>
</tr>
<tr>
<td>Do your jaw muscles become tired frequently?</td>
<td></td>
</tr>
<tr>
<td>Do you have difficulty opening your mouth widely?</td>
<td></td>
</tr>
<tr>
<td>Have you ever had arthritis?</td>
<td></td>
</tr>
<tr>
<td>Does any family member or relative have arthritis or gout?</td>
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<tr>
<td>Have you ever received a severe blow to the side of the head or jaw?</td>
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<tr>
<td>Have you ever had pain in your jaw joints?</td>
<td></td>
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<tr>
<td>Have you ever had problems with your ears, such as ringing or change of hearing?</td>
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<tr>
<td>Do you ever have grating sounds from your jaw joints?</td>
<td></td>
</tr>
<tr>
<td>Do you ever hear clicking or popping sounds from your jaw joints?</td>
<td></td>
</tr>
<tr>
<td>Do you feel your bite is closed?</td>
<td></td>
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<tr>
<td>Are you presently in pain from your jaw joints or muscles?</td>
<td></td>
</tr>
<tr>
<td>Does your pain or discomfort from your jaw joint interfere with your work or other activities?</td>
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<tr>
<td>Are there times when you notice that this problem or pain is less or gone completely?</td>
<td></td>
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<tr>
<td>Are you afraid your problem is serious?</td>
<td></td>
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<tr>
<td>Do you feel you need treatment for this problem?</td>
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<tr>
<td>Do you have problem with insomnia?</td>
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<tr>
<td>Are you under a great deal of stress, job, family, social, school.....?</td>
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<tr>
<td>Do you take more than one alcoholic drink per day?</td>
<td></td>
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<tr>
<td>Do you smoke cigarettes, cigars or a pipe?</td>
<td></td>
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<tr>
<td>Do you bite your nails, tongue or lips?</td>
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<tr>
<td>Do you have young children in your care?</td>
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</tbody>
</table>
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TMJ AND FACIAL PAIN EXAMINATION

DATE / /

PATIENT NAME_________________________ AGE_______________________

REFERRAL SOURCE____________________________________________________

OCCUPATION_________________________________________________________

CHIEF COMPLAINT: _____________________________________________________

RATE YOUR SYMPTOMS ON A SCALE OF 1-10, (1=NO SYMPTOMS, 10=MAX.)

1 ------- 2 ------- 3 ------- 4 ------- 5 ------- 6 ------- 7 ------- 8 ------- 9 ------- 10

FORCED DECISION PIE CHART

LIST C.G. % IMPORTANCE

1. _________________________________________________________________
2. _________________________________________________________________
3. _________________________________________________________________
4. _________________________________________________________________
5. _________________________________________________________________

I. HISTORY

A. ONSET OF SYMPTOMS________________________________________________

LOCATION OF PAIN____________________________________________________

DURATION OF PAIN____________________________________________________

TIMING OF PAIN_______________________________________________________

NATURE OF PAIN: ___SHARP ___STABBING ___BURNING ___DULL ACHIE ___TINGLING ___NUMBING ___HEAVY PRESSURE?

MEDICATIONS TAKEN FOR PAIN: EFFECTIVE: _______________________________

NON-EFFECTIVE: ______________________________________________________

OTHER MEDICATIONS TAKEN: ___________________________________________

ALLERGIES: __________________________________________________________

TOBACCO: □ YES □ NO______________ALCOHOL: □ YES □ NO TYPE/AMOUNT________

ACCIDENT OR TRAUMA: □ YES □ NO WHAT? _______________________________

WHEN? ________________________________ ARTHRITIS: □ YES □ NO OSTEO, RHEUM. ______________

HEAD/NECK SWELLING: □ YES □ NO FACIAL ASYMMETRY: □ YES □ NO

HEADACHE HX: □ YES □ NO MIGRAINE ___ VASCULAR ___ MUSCULAR ___ CLUSTER___

AMP/PM HOURS PER DAY ___ LEFT/RIGHT FREQ.: ___________________________

MEDICATIONS TAKEN FOR HEADACHE: __________________________________

B. HISTORY SUMMARY________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

C. SIGNIFICANT MEDICAL HISTORY_______________________________________

_____________________________________________________________________

_____________________________________________________________________

D. BASIC HEALTH HABITS_______________________________________________

_____________________________________________________________________

_____________________________________________________________________

E. PRIMARY STRESSORS__________________________________________________

_____________________________________________________________________

_____________________________________________________________________

F. ANXIETY? ________________________ NO  G. DEPRESSION? __________________NO
II. SYMPTOMATOLOGY

<table>
<thead>
<tr>
<th>Symptom</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
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</thead>
<tbody>
<tr>
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<td>☐</td>
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<td>Earaches</td>
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<td>Clogged Ears</td>
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<td>Ringing/Roaring</td>
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<td>Hearing Loss</td>
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<td>Pressure And/Or</td>
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<td>Pain Behind Eyes</td>
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<td>Numbness In Face</td>
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<td>Neck Pain</td>
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<td>Dizziness (I Spin)</td>
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<td>Vertigo (Room Spins)</td>
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<td>Numbness/Tingle</td>
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<td>Hands/Fingers</td>
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<td>Sensitive/Sore Teeth</td>
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<tr>
<td>Facial Pain</td>
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<td>☐</td>
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<td>Joint Pain</td>
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</table>

A. DIAGRAM THE SYMPTOMS

B. WHAT ARE YOU DOING TO HELP THE PAIN/DYSFUNCTION?
Examination

- Soft tissue and cancer screening
- Cranial nerve screening exam
- Functional classification
- Joint based malocclusion
- Range of motion
- Muscle exam
- End feel - normal, soft, hard
- Joint exam
- Auscultation: stethoscope or doppler
- Cervical range of motion
- Parafuncttion and sleep and airway screen
- Imaging: CBCT and MRI
III. EXAMINATION

A. ORAL PATHOLOGY:

ABNORMAL: TONGUE □ YES □ NO
GINGIVA □ YES □ NO
LYMPH NODES □ YES □ NO
MUCOSA □ YES □ NO
GLANDS □ YES □ NO
MYXEDEMA □ YES □ NO
PTOSIS □ R □ L
MYODIASIS □ R □ L
DRY MOUTH □ YES □ NO
CHEEK, TONGUE, LIP CHEWER □ YES □ NO

B. CRANIAL NERVES SCREENING EXAM

I. SMELL □ YES □ NO
II. SIGHT □ YES □ NO
III. IV. VI: MOTOR EYE - X-TEST □ YES □ NO
VI. 2, 3: SENSORY FACE □ YES □ NO
VII. FACIAL N. - ANT. 23 TASTE, MOTOR TO FACE □ YES □ NO
VIII. AUD/VESTIB HERRING AND BALANCE □ YES □ NO
IX. GLOSSOPHARYNGEAL: UVULA/PSTERIOR TASTE □ YES □ NO
X. VAGUS - PHARYNX REFLEX □ YES □ NO
XI. ACCESSORY: TRAP. AND SCM MOTOR □ YES □ NO
XII. HYPOGLOSSAL: TONGUE OUT IN MIDLNE? □ YES □ NO
C 2-3: POSTERIOR HEAD AND NECK DERMATOMES □ YES □ NO

C. DENTAL

OCCCLUSION
CENTRIC RELATION PREMATURETY □ □ SLIDE □ □ NM R/L/P

A. ANGLE MOLAR CLASS: RIGHT I, II-1, II-2, III
LEFT I, II-1, II-2, III

B. SKELETAL CLASS: □ □ □ □ □ □

C. CUSPID: CONTACT □ YES □ NO □ POSITION?

D. CENTRIC CONTACTS
(Circle inadequate Contacts Areas)
CO - ANTERIOR LEFT POSTERIOR RIGHT POSTERIOR
CR - ANTERIOR LEFT POSTERIOR RIGHT POSTERIOR

E. CROWDING: MAX. ANT. MAND. ANT. MAX. POST. MAND. POST.

F. MISSING TEETH?

G. GROSS MALOCCLUSIONS: □ YES □ NO

H. ANTERIOR GUIDANCE: RIGHT-CUSP/GF, AGF, GF, PGF, ANT. OPEN
LEFT-CUSP/GF, AGF, GF, PGF, ANT. OPEN

I. CROSSBITES: ANTERIOR POST. LEFT POST. POST. RIGHT


K. FREMITUS: □ 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12

L. MOBILITY: (1, 2, 3) □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

M. DENTAL PROTHESIS: SATISFACTORY/ UNSATISFACTORY

N. WEAR FACETS: 0 □ □ □ □ 1 □ □ □ □ 2 □ □ □ □ 3 □ □ □ □ 4 □ □ □ □ 5 □ □ □ □

1. DENTAL SOURCE OF PAIN

A. CARIES?
B. ENDO?
C. PERIO?
D. OCCLUSAL TRAUMA?
E. THIRD MOLARS?
F. INFECTION OR LESION?
G. OTHER?
### D. MUSCLE EXAM

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### 2. JOINT PALPATION AND JOINT LOADING TESTS

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### E. JOINT EXAM

#### 1. JOINT NOISE - DOPPLER AUSCULTATION

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<td>KEY TO CREPITATION</td>
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Soft Tissue and Cancer Screening:

This encompasses careful visual inspection and digital palpation of areas of swelling, discoloration, asymmetric masses, nodules, and unusual surface texture. If any suspicious lesions are encountered during this evaluation, immediate referral for work-up with biopsy and imaging is critical. Secondary myalgia might be present due to pain from swelling or distraction. Be vigilant of symptoms of numbness or tingling as this is a sign of compression from an enlarging mass.

Cranial Nerve Screening Exam:

Cranial nerve dysfunction is an indicator of neurologic disease. Recall the pneumonic, On Old Olympus Towering Tops a Fin and German Viewed some Hops, and review the function of all 12 cranial nerves.

I. Olfactory
II. Occipital
III. Occulomotor
IV. Trochlear
V. Trigeminal
VI. Abducens
VII. Facial
VIII. Auditory
IX. Glossopharyngeal
X. Vagus
XI. Spinal Accessory
XII. Hypoglossal

Most common Cranial nerves involving range of motion problems are V, VII, IX, and XI. Dysesthesia, dystonia, and entrapments of nerves between hyperactive muscles or swollen glands, can alter function. Tumors in the cerebral pontine angle can lead to neuralgia in the trigeminal nerve. The trigeminal system is comprised of efferent, afferent, and parasympathetic elements. It innervates all parts of the face and masticatory system. Descending fibers of the trigeminal nerve also converge with the C-1, C-2, and C-3 in the nucleus caudalis and can be responsible for referred pain patterns from the cervical spine which influence jaw range of motion. Conditions like neuralgia also show concomitant myalgia and myofascial pain, related to grimace and avoidance.

Reading textbooks to review the functional anatomy of the cranial nerves will greatly enhance your understanding of the relationship of these innervating...
structures and the maintenance of pain, changes in efferent patterns to the muscle, and diseases which affect the oromandibular system.

**Functional Classification:**

It is important to understand how a patient uses their masticatory system. Large elevator muscles are indicators of high force potential. Anterior constricted occlusions can affect the structures of the TMJ. Kois describes an anterior constriction pattern as an anterior tooth position which constricts the envelope of function, thus forcing the condyle to function in a distalized position within the condylar fossa. This distalized position can lead to retrodiscitis and predispose the temporomandibular joint to anterior disc displacement. There are predisposing, precipitating, and perpetuating factors leading to the initiation, expression, and continuation of temporomandibular disorders (TMD) range of motion problems.

The wear on teeth can lead to sensitivity and dental disease which can contribute to muscle guarding. Muscle guarding can cause myalgia which can shorten the effective range of the muscle, leading to a decrease in jaw movement. Factors can become intertwined between diagnostic groups.

Movement disorders, like Parkinson’s disease, tremor, adverse oral habits or fixations, and clenching are all noted during the functional exam. Oclusal dysfunction can be an indicator of joint based occlusal shift.

**Joint Based Malocclusion**

Changes in the condylar and articular vertical dimension can influence the occlusion. An anterior displaced disc can cause 2-3 mm of decreased intra-articular space and can account for a distalized shift on the affected side. Conditions such as arthritis, avascular necrosis, and juvenile osteochondrosis all affect the condylar / ramus height and cause ipsilateral occlusal shift. Cone beam computerized tomography allows precise measurement and observation of joint based occlusal shift.

**Range of Motion (ROM)**

The mandibular range of motion, or arthrokinetics, is measured between a fixed point on the upper and lower jaws, usually the central incisors. The normal maximum unassisted opening for an adult ranges from 40-55 mm. Lateral movement is normally about 25% MO or 8-12 mm. Measuring the ROM is not only important in developing baseline data, but also to assess improvement in jaw function during management. The measurement of maximum opening must take into account the overbite which should be added to the inter-incisal measurement.
for accuracy. For example; a 6 mm overbite and a 35 maximum opening (MO) inter-incisal is actually a 41 mm maximum opening. Protrusive movement is a reflection of translation and should measure between 8-12 mm.

According to Posselt, rotational movement accounts for approximately the first 20-25 mm of inter-incisal opening. This is important when considering a disorder which blocks the translation of the condyle. If a patient deviates to the right with a 25 mm MO, and has a deviation to the right, it is possible that an adhesive problem in the right joint might have occurred. A 25 mm MO with no deviation suggests a bilateral joint problem or a muscle problem such as myalgia or contracture.

![Arthrokinetic Diagram](image)

The arthrokinetic diagram is a visual graphic which depicts the direction and magnitude of the range of motion in three planes. For instance, a 25 mm MO with no deviation which has a right and left lateral ROM of 12 mm would be suspicious of a myogenous problem since the translation has a normal value. The arthrokinetic diagram can be helpful in diagnosis and tracking of treatment goals.

**Muscle Palpation**

Testing the muscle consists of palpating for trigger points, taut bands, or pain within functional ranges of movement. To illustrate the pressure used to palpate one should take an uncooked egg and press into the shell until it breaks. Your muscle palpation should not exert enough pressure to break the egg. Palpation of a trigger point might set off a pain response in another site, this is a referred pain. The site of pain is not always the source of the pain. Muscle trigger points can refer pain to teeth, joints, mucosa, ears, scalp, eyes, and sinuses. One should refer to the Travell and Simons’ book on trigger points for detailed explanations of myofascial pain.
Unprovoked muscle pain, such as seen with myositis or myalgia, can easily be identified with light pressure to the inflamed, swollen, or infected muscle. Myofibrotic contracture feels very stiff and unrelenting.

**End Feel**

End feel is the sensation of arrest of jaw movement as the clinician’s finger gently distracts the mandible downward with a finger on the incisal edge while stabilizing the maxilla. The end feel is described as normal, soft (spongy), or hard. Normal end feel will show no restriction until the MO is reached when jaw movement comes to a painless ligamentous end point.

A soft end feel means that the muscle is guarding due to a myogenous problem. Vapocoolant spray administered from the origin to the insertion while stretching the muscle can release as much as 50% of a myofascial pain trigger point. Myositis and myalgia will show a soft end feel but show little or no release.

A hard end feel has a sense of a firm arrested movement which is shorter than the MO. This represents either a joint locking problem such as ankylosis, or anterior disc displacements or possibly a myofibrotic contracture. Therefore end feel is important for the assessment and differentiation of range of motion disorders.

**Joint Exam**

Gentle palpation of the lateral and retrodiscal tissues helps to delineate synovitis or capsulitis. Pain in the joint signifies inflammation or infection. Referred pain from the masseter, temporalis, and pterygoid muscles can cause referred pain to the temporomandibular joint. A spreading receptor field occurs when algogenic substances build up in inflamed tissues leading to hyperalgesia of a regional area near the source of pain. Therefore pain in one tissue can spread to another due to converging nociceptive pathways. Deep muscle pain from myositis, myalgia, infection, traumatic hematoma, tumors, or surgical trauma can cause spreading pain.

Moving the articulation can elicit information about the condition of the ligaments, capsular, and intra-articular structures. Gentle loading can produce either a response to joint inflammation, edema, and tendonous or myogenous pain. Loading cannot definitively differentiate arthrogenous pain from myogenous pain since often they coexist. However if a joint is severely inflamed it will certainly react to loading pressure. Loading is accomplished by placing distalizing pressure to the chin or upward pressure from the angle of the mandible. Temporomandibular joint loading can detect the absence of pain in the articulation but, loading is not as helpful in differentiating arthrogenous from myogenous pain.
Auscultation

Joint sounds can be auscultated with a stethoscope or a doppler ultrasound unit. Joint sounds include crepitation, clicking, rhonchi, vascular pulsation, and swooshing edema. The stethoscope is adequate for hearing clicks and coarse crepitation but the doppler ultrasound is better for assessing edema, hyperemia, and grading crepitation. Joint vibration analysis is an instrument which may be helpful in recording the nature of joint sounds for documentation purposes.

Timing of clicks is indicative of the degree of anterior displacement of a disc. Open and closing clicks are known as reciprocal clicks. The later the click occurs in the opening phase and earlier the click occurs in closing phase, determines the degree of ligament tear or stretch. Anterior displaced discs without reduction are often silent, since only rotation occurs. Edema can be picked up as a swooshing sound during movement. Hyperemia can be detected as a loud pulsation and denotes inflammation in the synovium and retrodiscal tissues. Rhonchi are chirping like sounds which represent adhesive changes in the joint.
Range of Motion Disorders: The Restorative Dentist’s Dilemma

F. RANGE OF MOTION

Max opening w/o pain _______ MM.
Max opening with pain _______ MM.
Lateral R _______ MM. L _______ MM.
Deflection on opening □ Right □ Left
Deflection on protrusion □ Right □ Left
Overbite: _______ MM. Overjet _______ MM.
End feel: □ Normal □ Spongy □ Hard □ Boney

CERVICAL EXAM

History of C-spine disease or injury:

LIMITATION

Extension (80 deg) □ Yes □ No
Flexion (45 deg) □ Yes □ No

PAIN

Limitation - Right Pain □ Yes □ No
Limitation - Left Pain □ Yes □ No

Rotation (80-90 deg) □ Yes □ No
Side bend (60-70 deg) □ Yes □ No

POSTURE

Head forward posture ____________________________
Sleeping position - back, side, prone ____________________________
Parafunational sleeping habit □ Yes □ No
Work posture - stand, sit ____________________________

G. HABITS

Bruxism _______ Clenching _______ Tooth pressing _______
Other ____________________________

H. EMOTIONAL FACTORS:

A. Children?
B. Sleep well?
C. Spouse support?
D. Job satisfaction?
E. Depression?
F. Litigation pending?
G. Substance abuse?

NOTES ON FIRST IMPRESSION:

__________________________

TMJ scale _______ Chronic pain battery _______ MMPI _______ Impath

Imaging Orders: Panorex _______ Tomograms-A, B, C, O, CR, CO _______ AP-Tomo
MRI _______ Arthrogram _______ Bone scan _______ L. Cephi _______ A.P. Cephi
Cervical film _______ Other ____________________________

IV. CLINICAL IMPRESSION: (Dx)

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________
6. ____________________________

NOTES:

__________________________
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Cervical Range of Motion

Cervical spine posture influences the mandibular movement and rest position. Head forward posture can cause airway constriction and cervical myalgia. The angle of the jaw is innervated by the cervical nerves and can be mistaken for masseter muscle or joint pain. Injuries such as hyper-flexion or hyperextension trauma can cause pain and cervical strain. Observing flexion, extension, side bend, and rotation of the head is important for the craniomandibular assessment. Cervical range of motion disorders influence the position of the mandible during function and rest and thus the occlusion and can be implicated in obstructive sleep apnea by physically constricting the posterior aspect of the pharyngeal airway.

Parafunction, Sleep and, Airway Screen

Parafunctional posturing and bruxing are activities commonly found in patients with sleep disordered breathing. These patients may report difficulty opening their jaws in the morning. Obstructive sleep apnea has been associated with airway constriction and temporomandibular disorders. An Epworth scale questionnaire can screen for signs of sleep disordered breathing. Clinically the hard and soft palate, fauces, tongue size and position, osteomeatal complex, should be observed for signs of airway problems. If problems are noted, the clinician might consider referring the patient to a pulmonologist for a poly-somnogram.

Imaging: Cone Beam Computerized Tomography and MRI

Patients experiencing range of motion problems may require imaging to rule out differential diagnoses. Pathology which may be contributing to a range of motion disorder may go unnoticed without proper imaging. The use of imaging is diagnostically directed. The cephalometrically corrected tomograms in seated and open positions can be derived from a cone beam scan if an internal derangement is suspected. A cone beam scanner is a highly versatile instrument which allows reconstruction of images in two and three dimensions with a single short scan. A smaller field of view scan can be taken to observe condylar movement relative to the closed position. Cone beam scans allow viewing of the sinuses, temporomandibular joints, the atlanto-occipital junction, the osteomeatal complex, panoramic, airway, tongue space, occlusion, ramus height, integrity of the mandible and maxilla, and upper cervical spine. Three dimensional reconstructions are helpful for observing joint based occlusal shift.

Conditions such as lytic tumors, cysts, fractures, airway constriction, deviated nasal septa, ramus height asymmetry, arthritis, growth disorders, intra-osseous
infections, fractured teeth, and abnormal bony shapes are easily detected by using cone beam. The quality and density of bony structures can also be measured.

The cone beam reconstruction can be used to interpolate condylar position and disc position, however for definitive information a magnetic resonance image (MRI) provides the best soft tissue information. The Piper protocol for MRI provides an excellent method for analyzing craniomandibular structures. A proper temporomandibular joint or face coil and a 3.0 Tesla magnet offers the highest quality images. The T-2 or STIR are sensitive to water and will highlight edema, necrosis, and hyperemia. The T-1, and proton density settings show the disc, fat, marrow, retrodiscal tissues, and nodes as well as the brain. The combined observation of coronal and lateral views, provides detailed information about pathologic processes afflicting the jaw structures. MRI and CBCT have replaced temporomandibular joint arthrography, transcranial, and transpharyngeal imaging as the newer techniques are more accurate, less invasive, and more diagnostic.

Diagnostic categories which can alter the mandibular range of motion include: myogenous, arthrogenous, traumatic, and other medical or odontogenic disorders.

Mvogenous

1. Myositis (M60.9)
2. Tendonitis (M67.30)
3. Myospasm (M6240)
4. Local myalgia (M79.1)
5. Protective muscle splinting (M62.9)
6. Central mediated myalgia (M79.1)
7. Myofascial pain dysfunction (M79.1)
8. Myofibrotic contracture (M79.9)

Arthrogenous

1. Synovitis, retrodiscitis, and capsulitis (M65.9)
2. Anchored disc (M26.63)
3. Anterior displaced disc with reduction (M26.63)
4. Anterior displaced disc without reduction (M26.63)
5. Polyarthritides (M604.4)
6. Primary or secondary osteoarthritis (M19.91)
7. Avascular necrosis or retrograde resorption (M19.91)
8. Juvenile osteochondrosis (JOCD) (M19.91)
9. Boney and fibrous ankylosis (M26.61)

Trauma

1. Fracture, mandible or maxilla (S02.4x Max, S02.6x Mand)
2. Surgical trauma (myostatic contracture, myositis, nerve injury, swelling, ankylosis...)
3. Facial trauma (M502.XXX)
4. Injection trauma (M60.9)

**Dental / Medical Conditions**

1. Odontogenic pain; cracked tooth, abscess, caries, root hypersensitivity, primary occlusal trauma ... (lead to secondary local myalgia and muscle splinting)
2. Infectious or other medical condition; (as specified Lyme, tetanus, facial space ...)
3. Neoplasm or metastatic disease (as specified)
4. Systemic disease; (as specified) multiple sclerosis, Alzheimer's ...
5. Neuropathic and neurologic disorders
6. Psycho-emotional
7. Sleep Disordered Breathing-UARS, OSA, CSA
8. Parasomnias-Insomnia, REM Behavior, Disorder, Bruxism

**Treatment modalities for range of motion disorders:**

**Education and counseling**

Physical self-regulation (PSR)

1. Yoga
2. Meditation or prayer
3. Diaphragmatic breathing
4. Cardiovascular exercise
5. Nutritional modification
6. Cognitive Awareness training
7. Acceptance and therapeutic participation

Psychological and psychiatric services

1. Biofeedback
2. Psychotherapy
3. Cognitive Behavioral Therapy (ChronicPain)
4. CBTI (Insomnia)
5. Medical management for anxiety and depression

**Exercise and passive stretching**

Physical therapy

1. Myofascial release (MFR)
2. Ultrasound
3. Massage
4. Icing
5. Heat
6. Iontophoresis
7. Electrical stimulation
8. Postural education
9. Therapeutic exercise and strengthening
10. Rocabado 6x6 exercises

Splint therapy
1. Permissive splint therapy
2. Anterior positioning splint therapy
3. Sleep appliance or c-pap or bi-pap
4. Anterior disclusion splint: short term
5. TAP for Nocturnal Subluxation

Vapocoolant spray and stretch

Trigger point injections (Buffered Lidocaine)
1. Muscle
2. Tendon

Nerve Blocks
1. Sympathetic Ganglion
2. Auriculotemporal nerve
3. Greater and lesser occipital blocks
4. Diagnostic block to peripheral region

Medications
1. Oral steroid, steroid injection (Joint or Tendon)
2. Botox
3. Central acting muscle relaxants
4. Nsaids (non-steroidal antinflammatories)
5. Tricyclic antidepressants
6. Opioids
7. Antibiotics
8. Transdermal medications
9. Anticonvulsants

Surgical
1. Arthrocentesis
2. Arthroscopy
3. Arthrotomy
4. Fat graft
5. Rib graft
6. Joint replacement
7. Neurosurgery  
8. Sinus, septum, airway surgery

Referral  
1. Otolaryngologist  
2. Oral surgeon  
3. Neurologist  
4. Neurosurgeon  
5. Rheumatologist  
6. Pain management anesthesiologist  
7. Pulmonologist  
8. Internist or general practitioner
Myogenous

1. Myositis (M60.9)

Characteristics:

1. Inflammatory deep muscle pain and swelling
2. Pain with Movement
3. Etiology; infection, trauma, or prolonged spasm
4. May be secondary to odontogenic, parotid, fascial space infection, or osteomyelitis
5. End feel; soft and pain provoking

Treatment:

1. Treat causative factor; antibiotics, incision and drainage, GP referral
2. Rest and icing followed by PT
3. Permissive splint therapy
4. Muscle relaxants and Nsaids
5. Passive stretch as swelling resolves and muscle tissues heal

2. Tendonitis (M 67.30)

Characteristics:

1. Inflammation in the tendonous attachment; temporal tendonitis
2. Local myalgia

Treatment:

1. Steroid and local anesthetic injections
2. Permissive splint therapy
3. Physical therapy
4. Nsaids, muscle relaxants, steroid dosepak prn
3. Myospasm (M 62.40)

Characteristics:

1. Rapid Onset non-voluntary painful tonic contraction of muscle (cramp)
2. Marked increased EMG activity
3. Etiology: chronic muscle splinting, trauma, parafunction, emotional disturbance, medication, idiopathic.

Treatment:

1. Spray and Stretch
2. Nsaids
3. Muscle relaxants
4. PT; myofascial release, massage, and passive stretch
5. Permissive splint
6. Therapeutic injection
7. PSR
8. Psychotherapy prn

4. Local Myalgia (M79.1) or Protective Muscle Splinting- (M62.9)

Characteristics:

1. Delayed onset muscle soreness protective co-contraction
2. Post exercise or exertion pain in muscle
3. Pain on stretch or use.
4. Stiffness, weakness, fatigue
5. Soft end feel
6. Often seen post injury or during episode of acute inflammation in a joint or tendon
7. Infections; Lyme disease, malaria...

Treatment:

1. Address source of muscle splinting, such as: arthralgia and infectious disease
2. Ice and rest, reduce muscle overload
3. Nsaids, trigger point injections, nerve blocks
4. Permissive or anterior positioning splint therapy
5. Physical therapy
6. PSR
5. Central Mediated Myalgia (M79.1)

Characteristics:

1. Continuous chronic muscle pain  
2. Antidromic stimulation of peripheral nerves from central nervous system  
3. Chronic stress or up-regulated autonomic nervous system  
4. Fibromyalgia, chronic fatigue syndrome, chronic regional pain syndrome  
5. "Brain under siege, making a fist with face and jaw" (Tanenbaum)

Treatment:

1. Local muscle therapy will have limited effect  
2. Target down regulation of sensitized central nervous system  
3. Tricyclic antidepressants and anticonvulsants  
4. Central acting muscle relaxants and Nsaids  
5. Permissive splint therapy to disrupt peripheral input  
6. PSR and psychological therapy  
7. Sympathetic ganglion blocks and pain management

6. Myofascial Pain Dysfunction (M79.1)

Characteristics:

1. Regional dull aching at rest from chronic sustained contraction or overuse  
2. Painful taut bands (trigger points) in muscle or fascia from buildup of algogenic substrates  
3. Referred pain patterns, autonomic symptoms, tension type headaches, and hyperalgesia  
4. Etiology: sympathetic nervous system and central sensitization  
5. Soft end feel

Treatment:

1. 50% relieved by vapocoolant spray and stretch or lidocaine 2% (no epinephrine) injection of trigger point  
2. Rest, muscle relaxation and overload reduction  
3. PSR; decrease allostatic load  
4. Permissive splint therapy
5. PT
6. Psychological services and stress reduction
7. Muscle relaxants and tricyclic antidepressants

7. Myofibrotic Contracture (M79.9)

Characteristics:

1. Painless muscle shortening in the absence of pain unless extended beyond functional length
2. Fibrosis of muscle, tendons, and ligaments
3. History of trauma, infection, post-orthognathic surgery, post-craniotomy, injection trauma, or radiation therapy
4. May be refractory to total recovery of range of motion
5. Myostatic contracture is pre-fibrotic and less refractory to treatment

Treatment:

1. Steroids and antibiotics stat
2. PT
3. Passive stretching daily assisted, 30 minutes three times day
4. Therapeutic injections prn

Arthrogenous

1. Synovitis, Retrodiscitis, and Capsulitis (M65.9)

Characteristics:

1. Retrodiscal, capsular, and synovial inflammation can cause joint effusion
2. Local myalgia
3. Accumulation of pro-inflammatory cytokines in joint space
4. Capsular sprain from trauma
5. Joint and ear pain
6. T-2 or Stir MRI shows bright signal
7. May accompany any arthrogenous diagnosis
Range of Motion Disorders: The Restorative Dentist’s Dilemma

Treatment:

1. Acute: medrol dosepak, Nsaids, transdermal
2. Anterior positioner splint therapy at night only or short term
3. Permissive splint therapy for long term with parafunction
4. Arthrocentesis protocol prn

2. Anchored Disc Phenomena (M26.63)

Characteristics:

1. Decreased articular pressure causing adhesive suction cup effect between disc and fossa.
2. Hard end feel
3. May have synovitis, retrodiscitis, and capsulitis
4. Deviates toward the affected joint upon opening
5. Relatively normal disc position no history of clicking
6. Kinematic CBCT show decreased translation and a normal joint space
7. MRI shows disc adhered to fossa and not gliding

Treatment:

1. Arthrocentesis protocol
2. Splint therapy: anterior positioning followed by permissive splint therapy
3. Nsaids
4. PT

3. Anterior Displaced Disc with Reduction (M26.63)

1. An anteriorly displaced disc causes an opening and closing click
2. Tear in the collateral and retrodiscal ligaments
3. Synovitis, intermittent locking, or interference in activities of daily living

Treatment:

1. May be a happy clicker; no pain, no dysfunction, normal range of motion
2. Synovitis, retrodiscitis, or capsulitis - short term anterior positionning splint followed by permissive stabilization splint
3. Intermittent locking joint - nighttime anterior positioner splint
4. Myogenous pain - treat by diagnosis
5. Education and PSR
6. PT prn
7. Observe joint based occlusal shift and stabilize prn

Goal: Make a happy clicker. Joint recapturing strategies lack evidence for efficacy, except perhaps for young patients with an early diagnosis.

4. Anterior Displaced Disc without Reduction: (M26.63)

(AKA Closed Lock)

Characteristics:

1. MO 25-30 mm hard end feel, deviation to ipsilateral joint
2. MRI shows anterior dislocation of discs without reduction upon movement and reduced translation
3. May have synovitis, retrodiscitis, capsulitis, and effusion
4. Often preceded with a history of clicking
5. Myogenous problems per diagnosis

Treatment:

1. Arthrocentesis protocol
2. Nsaids prn
3. PSR and PT as needed
The cone beam volumetric scan enables the viewer to design orthogonal cuts through the tmj which are cephalometrically corrected and thus can be used to interpolate joint space. Asking the question, “Is there enough space for a disc to live there” one can interpolate from this view whether there is a disc displacement. This interpretation can be correlated to the MRI findings. Seated and open views show the positions of the hard and soft tissues.

Diagnosis of conditions such as juvenile osteochondrosis, osteoarthritis, and avascular necrosis can be made with careful analysis of the tomographic sections. These findings can be correlated with an MRI to establish the definitive diagnosis. Notice the specific differences in the presentation of the shape and form of the deformity in each of these entities. The disc is chronically anteriorly displaced in all of these entities.

The juvenile osteochondrosis is hypoplastic or underdeveloped relative to the fossa. This is a growth lag related to adolescent injury. Facial asymmetry and short small condylar and ramus with an intact cortical surface are pathognomonic for JOCD.

The osteoarthritis image has an osteochondritic type erosion on the articular surface. This is a top down degeneration pattern.

The condyle with avascular necrosis shows the collapse of the condyle from a marrow space necrosis. This is an internal condylar process which causes collapse of the articular surface from below. Some authors call this idiopathic condylar resorption. Retrograde remodeling causes joint based occlusal shift on the affected side, seen as an ipsilateral shift with anterior open bite.

Arthrocentesis

Arthrocentesis means joint lysis and lavage. This technique is a nonsurgical intervention where by a needle is inserted into the upper joint space of an affected temporomandibular joint and adhesions are released by means of hydrodynamic...
pumping with sterile saline solution. A second needle is inserted in the anterior portion of the superior joint space and the 60 -100 cc of saline flushes the joint clean of articular debris. Depomedrol is inserted in the joint and rigorous mobilization releases adhesions and range of motion is regained. Anterior positioning splint therapy acts like a crutch to the freshly irrigated joint and after two weeks a permissive splint is placed for daytime use to allow for the joint to begin returning to the articular fossa.

**Lark/ Shall Arthrocentesis Protocol:**

Arthrocentesis has a 90 % success rate for decreasing pain and increasing the range of motion over a long term. Splint therapy includes 24 hour anterior positioning splint for two weeks adding a permissive splint after two weeks during the daytime. Aftercare consists of six weeks of a “no chew” diet and maximum passive stretching of ten repetitions every awake hour. Splints are used as needed to prevent locking thereafter.

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior Joint Space</td>
<td>Release Adhesions</td>
</tr>
<tr>
<td>A Non-surgical Intervention</td>
<td>Irrigate out Pro-inflammatory Proteins</td>
</tr>
<tr>
<td>Hydrostatically Balloon Joint Space with Sterile Saline and Corticosteroid</td>
<td>Decrease Pain</td>
</tr>
<tr>
<td></td>
<td>Increase Range of Motion</td>
</tr>
<tr>
<td></td>
<td>Improving Joint Function</td>
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</tbody>
</table>

**Arthrocentesis Accomplishes:**

1. Normalization of Intra-Articular Pressure
2. Mobilization Adhered Discs
3. Flushing out Articular Debris
4. Mobilization the Condyle
**ARTHROCENTESIS DOES NOT:**

- Recapture or Reposition the Disc
- Repair Retrodiscal Perforations
- Reshape Disc
- Alter Articular Surfaces

**Criteria for Patient Referral for Arthrocentesis**

- Must Present One or More Diagnoses or Diagnostic Modifiers
- < MO, Locked or Adhesed Joint
- Arthralgia VAS Pain > 5, Responds to Auriculotemporal nerve Block
- Compromised ADLs
- Pre-Operative Conditioning Unsuccessful

**Rationale for Anterior Positioning Splint**

1. Relieves Retrodiscal Pressure Immediately Post Procedure
2. Changing alignment of Adhered Articular Remnants
3. Decreasing Chances of Recurrence of Adhesion (Remodels Over Time)
4. Prevent Recurrent Locking—“Crutch”
**Record for Anterior Positioner**

- Protruded Bite Record
- Most Retruded Posture

**Anterior Positioning Splint Therapy**

- 24/7 for Post Op 14 Days
- During Sleep- Weeks 2-6 Post Op
- Long Term : PRN for Locking and Arthralgia

**Rationale for Centric Permissive Splint**

- Allow the Joint to Reposition into the Articular Fossa
- Prevent Retrodiscl Hyperplasia
- Transition back MIP

**Permissive Centric Splint Therapy**

- Daytime use Weeks 2-6
- Adjust to walk Joints back to MIP as Joint Swelling Abates
- Long Term- Joint Based Malocclusion or Parafunction
Arthroscopy and arthrotomy are alternate procedures which are more invasive, have greater morbidity and complications, but have high evidence for success as well. Piper and others have shown the fat autograft to be a suitable inter-positional joint material. The fat establishes a blood supply and maintains a fibro-fatty cushion in place of the degenerated disc.

5. Poliarthritis’ (M60.4 )
   1. Autoimmune and mixed collagen diseases.
   2. Rheumatoid, gout, lupus, scleroderma, Sjogrens...
   3. Painful destructive lesions, progressive anterior open bite
   4. Serology, CBCT, MRI

Treatment:
   1. Splint therapy prn
   2. Refer to rheumatologist for medical management
   3. Surgical management

6. Primary or Secondary Osteoarthritis (M19.91)

1. Normally not inflammatory but initiated as a chondromalacia progressing into osteochondritic degradation of the articular surface of the condyle in response to overload.
2. Pain with function synovitis and effusion, decreased range of motion, and deflection to affected side.
3. CBCT shows radiographic evidence of osteophytes, subchondral sclerosis, and joint space narrowing
4. Myofascial pain, and local myalgia
5. Secondary osteoarthritis has the same process but has history of prior disease (i.e. trauma, systemic disease, hemarthrosis, or displaced disc)

Treatment:

1. Anterior positioning therapy or permissive splint therapy
2. PSR
3. Flector patch - transdermal Voltaren
4. PT- heat, cold, iontophoresis, exercise, myofascial release
5. Passive followed by active mobilization
6. Trigger point injections prn
7. Nsoids may be helpful in controlling exacerbations

7. Avascular Necrosis or Retrograde Resorption (M19.91)
   (Idiopathic Condylar Resorption)

1. Marrow necrosis leads to internal condylar articular surface collapse
2. Retrograde remodeling causes decrease in vertical ramus height
3. Effusion and synovitis, retrodiscitis, or capsulitis
4. Occlusal shift toward affected joint, anterior open bite
5. Pain and decreased range of motion
6. CBCT and MRI

Treatment:

1. Palliative - splints, Nsoids, PT
2. Surgery - arthrocentesis, fat graft, or total joint replacement

8. Juvenile Osteochondrosis (JOCD) (M 19.91)

1. Acquired growth lag induced by trauma to the developing condyle, ramus, and temporomandibular joint
2. Associated with disc dislocation or injury
3. Retrognathia, sleep apnea, asthma, and facial asymmetry
4. Amount of growth lag corresponds to the age and extent of injury
5. Imaging CBCT and MRI
Range of Motion Disorders: The Restorative Dentist’s Dilemma

Treatment: Goal is to treat condition as early as possible to decrease the extent of growth lag

1. Functional appliances, orthodontics, and surgery may be needed
2. Anterior displaced disc without reduction precedes JOCD
3. Imaging: CBCT and MRI

9. Fracture (S02.4X Max, S502.6 Mand)

1. Immediate referral to an oral surgeon
2. Alignment of the dental structures is critical in the open or closed reduction of fracture
3. Post-operative orders need to be followed closely
4. Arch bars and inter-maxillary fixation may cause myostatic or myofibrotic contracture
5. Passive stretching is critical when arch bars are removed
6. Passive stretching devices might be helpful
7. Beware of changes to the occlusion or temporomandibular joints during the course of healing
8. Problems such as internal derangement or skeletal or joint based malocclusion may need to be addressed
9. Diagnosis is the key

Traumatic

1. Surgical Trauma

1. Cutting of muscle attachments induces trismus and myositis
2. Bruising induced myositis
3. Intubation injury to discal structures
4. Myofibrosis from radiation treatment or reconstructive muscle and skin grafts

2. Boney and Fibrous Ankylosis (M 502.XXX)

1. A fibrous or boney fusion of the temporomandibular joint articulation.
2. Usually result of infection, fracture, or chronic inflammatory disease
3. Marked decrease in range of motion
4. Hard end feel.
5. Requires arthroscopic debridement, arthrotomy and fat graft, or possible joint replacement.
3. Infection:

Myositis and Trismus; odontogenic, post oral surgery, parotid, salivary glands, fascial space, osteomyelitis, tetanus…..

4. Injection Trauma (M60.9)

1. Post mandibular nerve block
2. Hematoma
3. Direct nerve trauma or muscle anesthetic toxicity
4. Delayed onset myofibrotic contracture
5. Follow injury with antibiotics, steroids, Nsaids
6. Requires 10-15 weeks of passive stretching

5. Nerve Injury:

1. Dysesthesia in lower lip and tongue
2. Steroid 5 days of oral dexamethasone decreasing dose 20,16,12,6,3 mg.
3. Consult oral surgeon for mapping of numbness or dysesthesia
4. Nerve graft around 4-6 months if no improvement

6. Hematoma: Traumatic, Post-Surgical, or Injection Trauma

1. Can lead to a fascial space infection
2. Myogenous; myositis or myofibrotic contracture
3. Hemarthrosis is bleeding in the joint which can occur with direct trauma
4. Leads to free radical release, swelling, and may cause adhered disc phenomena or fibrous ankylosis

Treatment:

1. Antibiotic 10 days amoxicillin 500 QID or equivalent if allergy.
2. Medrol Dose Pak followed by 20 days 800mg Ibuprofen tid or equivalent
3. Icing for first 48 hours followed by passive stretching and PT as swelling resolves
4. May take up to 15 weeks for trismus to resolve
5. Refer to oral surgeon if fever, continued dysesthesia, or numbness

Dental/ Medical Pathology:

1. Odontogenic pain
a. Cracked tooth syndrome  
b. Caries and pulpal pathology  
c. Root hypersensitivity –Recession, chemical/erosion, abrasion  
d. Primary/secondary occlusal trauma  
e. Herpes and aphthous stomatitis  
f. Glossitis and burning mouth syndrome  
g. Occlusal trauma  

Caution:

Continuous odontogenic neuropathic pain can mimic organic odontogenic disease. If there is no evidence of organic disease, it is prudent to delay treating a tooth with endodontic therapy or extraction as the pain condition may persist. Since muscle guarding is common with this disorder, the range of motion may decrease as a protective mechanism. Local or central myalgia may present.

2. Chronic Neuropathic Central Mediated Pain

   Neurologic disease can be congenital, acquired, degenerative, or genetic. Movement disorders grossly affect oromandibular function. Pain processing takes place in the central nervous system.

   Peripheral tissue injury can cause initial nociception which is followed by a release of algogenic pro-inflammatory cytokines at the site of injury. Over time, central sensitization can take place, leading to spreading receptor fields and referred pain. This can exhibit a reflexive decreased range of motion from a psycho-neuropathic overlay.

   The central nervous system can become hyper-excitable. This can decrease the dampening effect of descending afferents nerves. The central nervous system can continue to stimulate the pain signaling even after the site of injury has healed. This is the onset of neuropathic pain.

   Glial cells respond to inflammation and injury by signaling the inflammatory response to the injured site. When the central nervous system becomes sensitized, the glial cell response becomes heightened and hyperalgesia, allodynia, and continuous pain ensue. This is the foundation for chronic centrally mediated myalgia pain, fibromyalgia, myofascial pain, continuous dento-alveolar neuropathic pain, opioid tolerance, addiction, and substance abuse.

   Treatment for continuous neuropathic pain consists of anticonvulsants, tricyclic antidepressants, opioids, and topical transdermal medications. Nsais, benzodiazepines, central acting muscle relaxants, greater occipital nerve, lessor occipital nerve, and stellate ganglion blocks may be helpful. New classifications of toll-like receptor agonists are currently in stage two clinical trials. The goal is to dampen and reset normal glial function to control the neuropathy and to reset hemostasis of normal glial system function.
This emphasizes the importance of profound peri-surgical analgesia and anesthesia as well as early and aggressive treatment of injuries and trigeminal mediated injury or disease. Central nervous system plasticity and comorbid neurovascular pain phenomena are complicating factors. To date there are more questions than answers to treating neuropathic problems but scientific research continues. The goal is to prevent central sensitization and neuroplastic changes by preventing c-fiber discharge (slow pain) to the CNS.

Patients with neuropathic pain conditions are quite intolerant of dental procedures and have a hard time with opening for long appointments. They often have memories of painful dental experiences which can lead to excessive contraction and sympathetic nervous system up-regulation from the stress of anticipating or going to a dental appointment. They also typically have low pain thresholds, hyperalgesia, and allodynia. These patients often guard the jaw opening during dental appointments. The more chronic pain becomes the more the affective components play a role. Cognitive behavioral therapy to unlearn the pain behavior is critical as each patient must participate in their own care by employing physical and psychological self-regulation. Patients can unlearn their pain with CBT by enhancement of the endogenous central inhibitory pathway.

3. Neoplasia or Metastatic Disease(Specified)

Refer Stat to oral surgeon or otolaryngologist if:

1. There are sinister appearing lesions, radiologic findings, or unexplained swelling
2. Conditions not responding to usual course of treatment
3. Numbness or dysesthesia with no discernible cause
4. Unremitting Pain 9-10 VAS score, first worst pain scenarios not attributable to known entity
5. Sudden changes such as garbled speech, altered cognition, or lip drooping, refer to emergency room to rule out a cerebral vascular event or stroke

4. Infection and other Medical Diseases:

Examples: Refer to infectious disease medical doctor
   a. Tetanus; bacterium clostridium tetani (lock jaw)
b. Lyme Disease; borrelia bacteria, tick and mosquito carriers
c. Trichinosis; roundworm trichinella spiralis
d. Temporal arteritis; giant cell ischemia in temporal artery
e. Parortitis; viral, bacterial, or fungal infection, or sialolith
f. Otitis media or externa

5. Systemic Disease (Co-morbidities)
a. Degenerative disease
b. Immune disease
c. Diabetes
d. Cardiovascular disease
e. Endocrine disorders
f. Etc.

6. Psycho-emotional Disorders (refer to mental health provider)
a. Anxiety disorder
b. Depressive disorder
c. Post-traumatic stress disorder
d. Substance use disorders
e. Sleep disorders
f. Personality disorders
g. Somatoform disorders (body dysmorphia and obsessive compulsive disorder)
h. Conversion disorder / secondary gain
i. Hypochondriasis
j. Malingering
Reassessment

It is important to reassess the patient’s conditions and progress using the SOAP note format. If the assigned treatment is not successful in managing the patient’s problem, the clinician must consider:

1. Ongoing allostatic load
2. Irreversible tissue injury
3. Complicating comorbid factors
4. Secondary gains
5. Multiple diagnoses-Comorbidity
6. Wrong diagnosis

When in doubt, refer to a more experienced clinician or specialist.

Date___________ 1--------2--------3--------4--------5--------6--------7--------8--------9--------10

SUBJECTIVE __________________________________________________________

MO _______ MO 6 Pain _______ R _______ L _______
Joint Palp _______ R _______ L _______

OBJECTIVE __________________________________________________________

Appliance Adjusted ☐ Yes ☐ No
RX CBT ☐ Yes ☐ No
RX PT. ☐ Yes ☐ No

ASSESSMENT __________________________________________________________

RTC ________________________________________________________________

PLAN Refer Rx?

______________________________________________________________
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