Manual and Rehabilitative Management of

TEMPOROMANDIBULAR DYSFUNCTION (TMD)

A Common Presentation

Mary's history

- Middle age female
- Smoker
- Chronic neck pain
- 1 month worsening paresthesia from left arm to 1st-3rd digit

A Common Presentation

Mary's examination

- Consistent with mild C6 radiculopathy
- Segmental dysfunction
- Regional postural imbalance
  - Forward head posture
- X- ray evaluation reveals mild multilevel DDD, otherwise negative.
  - Study limited by patient's inability to open the mouth fully for APOM view.

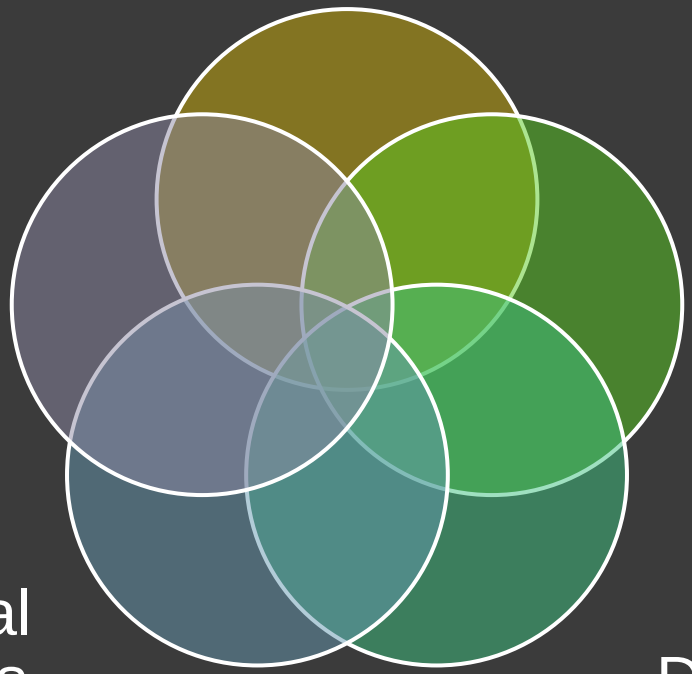
Presentation Outline

- Classification of TMD
- Usual care for TMD
- Anatomy
- Kinesiology
- Functional evaluation
- Rehabilitative intervention
- Self care

Classification of TMD

Capsulitis

Functional Alteration



Myofascial Pain

Psychosocial Confounders

Disc Derangement

Usual Care of TMD

- Over the years, Mary has tried
  - A night splint
  - Courses of NSAIDs
  - Muscle relaxers
  - Self massage
  - Accepting the fact that she “has TMJ.”
- What about EBP?

J Oral Rehabil. 2010 May;37(6):430-51. Epub 2010 Apr 20.

Management of TMD: evidence from systematic reviews and meta-analyses.

List T, Axelsson S.

This systematic review (SR) synthesises recent evidence and assesses the methodological quality of published SRs in the management of temporomandibular disorders (TMD). A systematic literature search was conducted in the PubMed, Cochrane Library, and Bandolier databases for 1987 to September 2009. Two investigators evaluated the methodological quality of each identified SR using two measurement tools: the assessment of multiple systematic reviews (AMSTAR) and level of research design scoring. Thirty-eight SRs met inclusion criteria and 30 were analysed: 23 qualitative SRs and seven meta-analyses. Ten SRs were related to occlusal appliances, occlusal adjustment or bruxism; eight to physical therapy; seven to pharmacologic treatment; four to TMJ and maxillofacial surgery; and six to behavioural therapy and multimodal treatment. The median AMSTAR score was 6 (range 2-11). Eighteen of the SRs were based on randomised clinical trials (RCTs), three were based on case-control studies, and nine were a mix of RCTs and case series. Most SRs had pain and clinical measures as primary outcome variables, while few SRs reported psychological status, daily activities, or quality of life.

There is some evidence that the following can be effective in alleviating TMD pain: occlusal appliances, acupuncture, behavioural therapy, jaw exercises, postural training, and some pharmacological treatments.

Evidence for the effect of electrophysical modalities and surgery is insufficient, and occlusal adjustment seems to have no effect. One limitation of most of the reviewed SRs was that the considerable variation in methodology between the primary studies made definitive conclusions impossible.

J Orofac Pain. 2010 Spring;24(2):152-62.

Acupuncture for temporomandibular disorders: a systematic review.

Cho SH, Whang WW.

AIMS: To assess the effectiveness of acupuncture for the symptomatic treatment of temporomandibular disorders (TMD) from a review of studies using randomized controlled trials (RCTs).
METHODS: Electronic databases were systematically searched for articles reporting RCTs investigating acupuncture for TMD. The methodological qualities of eligible studies were assessed using the criteria described in the Cochrane Handbook.
RESULTS: Nineteen reports were systematically reviewed. There was moderate evidence that classical acupuncture had a positive influence beyond those of placebo (three trials, 65 participants); had positive effects similar to those of occlusal splint therapy (three trials, 160 participants); and was more effective for TMD symptoms than physical therapy (four trials, 397 participants), indomethacin plus vitamin B1 (two trials, 85 participants), and a wait-list control (three trials, 138 participants). Only two RCTs addressed adverse events and reported no serious adverse events.
CONCLUSION: This systematic review noted moderate evidence that acupuncture is an effective intervention to reduce symptoms associated with TMD. There is a need for acupuncture trials with adequate sample sizes that address the long-term efficacy or effectiveness of acupuncture.

J Orofac Pain. 2010 Summer;24(3):237-54.

Systematic review and meta-analysis of randomized controlled trials evaluating intraoral *orthopedic appliances* for temporomandibular disorders.

Fricton J, Look JO, Wright E, Alencar FG Jr, Chen H, Lang M, Ouyang W, Velly AM.

AIMS: To conduct a systematic review with meta-analysis of randomized controlled trials (RCTs) that have assessed the efficacy of intraoral orthopedic appliances to reduce pain in patients with temporomandibular disorders affecting muscle and joint (TMJD) compared to subjects receiving placebo control, no treatment, or other treatments.
RESULTS: A total of 47 publications citing 44 RCTs with 2,218 subjects were included. Ten RCTs were included in two meta-analyses. In the first meta-analysis of seven studies with 385 patients, a hard stabilization appliance was found to improve TMJD pain compared to non-occluding appliance In the second meta-analysis of three studies including 216 patients, a hard stabilization appliance was found to improve TMJD pain compared to no-treatment controls.
CONCLUSION: Hard stabilization appliances, when adjusted properly, have good evidence of modest efficacy in the treatment of TMJD pain compared to non-occluding appliances and no treatment. Other types of appliances, including soft stabilization appliances, anterior positioning appliances, and anterior bite appliances, have some RCT evidence of efficacy in reducing TMJD pain. However, the potential for adverse events with these appliances is higher and suggests the need for close monitoring in their use.

Cochrane Database Syst Rev. 2009 Oct 7;(4):CD004973.

Arthrocentesis and lavage for treating temporomandibular joint disorders.

Guo C, Shi Z, Revington P.

BACKGROUND: Temporomandibular joint disorders are important oral health problems, reducing the quality of life of sufferers. It has been estimated that approximately 20% to 30% of the adult population will experience temporomandibular joint dysfunction. Arthrocentesis and lavage has been used to treat temporomandibular joint disorders for about 10 years, but the clinical effectiveness of the therapy has not been summarized in the form of a systematic review.
OBJECTIVES: To assess the effectiveness and complications of arthrocentesis and lavage for the treatment of temporomandibular joint disorders compared with controlled interventions.
MAIN RESULTS: Two trials, at unclear to high risk of bias, were included in the review. The two trials, including 81 patients with temporomandibular joint disorders, compared arthrocentesis with arthroscopy. No statistically significant difference was found between the interventions in terms of pain. However, a statistically significant difference in favour of arthroscopy was found in maximum incisal opening (MIO) (weighted mean difference of -5.28 (95% confidence interval (CI) -7.10 to -3.46)).Mild and transient adverse reactions such as discomfort or pain at the injection site were reported in both groups. No data about quality of life were reported.
AUTHORS' CONCLUSIONS: There is insufficient, consistent evidence to either support or refute the use of arthrocentesis and lavage for treating patients with temporomandibular joint disorders.
Further high quality RCTs of arthrocentesis need to be conducted before firm conclusions with regard to its effectiveness can be drawn.

Cranio. 2010 Jul;28(3):166-76.

Hyaluronic acid **in the treatment of TMJ disorders: a systematic review of the literature.**

Manfredini D, Piccotti F, Guarda-Nardini L.

Hyaluronate acid (HA) injections are gaining attention as a treatment option to manage symptoms of temporomandibular joint (TMJ) disorders, but updated evidence-based data on their effectiveness are actually lacking. The present paper aims to summarize and review systematically the clinical studies on the use of hyaluronic acid injections to treat TMJ disorders performed over the last decade.
Nineteen (N=19) papers were selected for inclusion in the review, twelve (N=12) dealt with the use of hyaluronic acid in TMJ disk displacements and seven (N=7) dealt with inflammatory-degenerative disorders. Only nine groups of researchers were involved in the studies, and less than half of the studies (8/19) were randomized and controlled trials (RCTs).
All studies reported a decrease in pain levels independently by the patients' disorder and by the adopted injection protocol. Positive outcomes were maintained over the follow-up period, which was varied among studies, ranging between 15 days and 24 months.
The superiority of HA injections was shown only against placebo saline injections, but outcomes are comparable with those achieved with corticosteroid injections or oral appliances. The available literature seems to be inconclusive as to the effectiveness of HA injections with respect to other therapeutic modalities in treating TMJ disorders.
Studies with a better methodological design are needed to gain better insight into this issue and to draw clinically useful information on the most suitable protocols for each different TMJ disorder.

Angle Orthod. 2007 May;77(3):542-8.

TMD in relation to *malocclusion and orthodontic treatment*.

Mohlin B, Axelsson S, Paulin G, Pietilä T, Bondemark L, Brattström V, Hansen K, Holm AK.

OBJECTIVE: The aim of this systematic literature review was to evaluate associations between different malocclusions, orthodontic treatment, and signs and symptoms of temporomandibular disorders (TMD).
RESULTS: Associations between certain malocclusions and TMD were found in some studies, whereas the majority of the reviewed articles failed to identify significant and clinically important associations. TMD could not be correlated to any specific type of malocclusion, and there was no support for the belief that orthodontic treatment may cause TMD. Obvious individual variations in signs and symptoms of TMD over time according to some longitudinal studies further emphasized the difficulty in establishing malocclusion as a significant risk factor for TMD. A considerable reduction in signs and symptoms of TMD between the teenage period and young adulthood has been shown in some recent longitudinal studies.
CONCLUSIONS: Associations between specific types of malocclusions and development of significant signs and symptoms of TMD could not be verified. There is still a need for longitudinal studies.

Am J Orthod Dentofacial Orthop. 2009 Nov;136(5):626.e1-16, discussion 626-7.

Orthognathic treatment and temporomandibular disorders: a systematic review.

Al-Riyami S, Cunningham SJ, Moles DR.

INTRODUCTION: There have been conflicting viewpoints in the literature regarding the effects of orthognathic treatment on temporomandibular disorders (TMD). A systematic review was conducted to determine the percentage of orthognathic patients with TMD, establish the range of signs and symptoms, and follow patients longitudinally through treatment for any changes in signs and symptoms.
METHODS: Part 1 of this 2-part article described the methodology of this review, with a narrative analysis of the study characteristics and the TMD classification methods. Part 2 describes the percentage of patients suffering from TMD and the signs and symptoms reported. Meta-analyses were conducted on data from clinically similar studies.
RESULTS: Pain decreased after surgery for both self-reported symptoms and clinically diagnosed pain on palpation. However, postsurgical results were more varied for joint sounds. The percentage of patients with clicking had a tendency to decrease postsurgery, but improvements in crepitus were questionable. The results from all meta-analyses in this review were subject to considerable statistical heterogeneity, and it was not possible to draw strong inferences relating to the percentage of orthognathic surgery patients with TMD with any degree of certainty.
CONCLUSIONS: Although orthognathic surgery should not be advocated solely for treating TMD, patients having orthognathic treatment for correction of their dentofacial deformities and who are also suffering from TMD appear more likely to see improvement in their signs and symptoms than deterioration.

Med Oral Patol Oral Cir Bucal. 2009 Jan 1;14(1):E3-7.

The use of *tricyclic antidepressants* in the treatment of temporomandibular joint disorders: systematic review of the literature of the last 20 years.

Cascos-Romero J, Vázquez-Delgado E, Vázquez-Rodríguez E, Gay-Escoda C.

Clinical Questions:
What is the evidence for the effectiveness of tricyclic antidepressants (TCAs) for treating adults with tempormandibular disorder (TMD)?
Main Results:
This study identified 11 relevant articles which included 368 participants and various, unspecified treatment outcomes for TCAs in the management of TMD. The authors identified only one controlled, double-blinded study. This study, which evaluated 12 female subjects during a 2-week period, with inconsistent outcomes between subjects. In addition, the authors identified a case-control study, a pilot study and eight literature reviews.
Conclusion:
The authors of the review made a "level B" recommendation (limited evidence) in favor of using TCAs for TMDs. However, this recommendation is based on a single controlled clinical trial that had significant methodological defects, such as insufficient sample size and lack of homogeneity in study populations. Currently, there are no scientifically valid studies that demonstrate effectiveness of TCAs for TMDs.

Phys Ther. 2006 Jul;86(7):955-73.

A systematic review of the effectiveness of *exercise, manual therapy, electrotherapy, relaxation training, and biofeedback* in the management of TMD.

Medlicott MS, Harris SR.

BACKGROUND AND PURPOSE: This systematic review analyzed studies examining the effectiveness of various physical therapy interventions for temporomandibular disorder.
RESULTS: The following recommendations arose from the 30 studies: (1) active exercises and manual mobilizations may be effective; (2) postural training may be used in combination with other interventions, as independent effects of postural training are unknown; (3) mid-laser therapy may be more effective than other electrotherapy modalities; (4) programs involving relaxation techniques and biofeedback, electromyography training, and proprioceptive re-education may be more effective than placebo treatment or occlusal splints; and (5) combinations of active exercises, manual therapy, postural correction, and relaxation techniques may be effective.
DISCUSSION AND CONCLUSION: These recommendations should be viewed cautiously. Consensus on defining temporomandibular joint disorder, inclusion and exclusion criteria, and use of reliable and valid outcome measures would yield more rigorous research.

J Oral Rehabil. 2011 Feb;38(2):120-35.

Do *computed tomography and magnetic resonance imaging* add to TMJ disorder treatment? A systematic review of diagnostic efficacy.

Ribeiro-Rotta RF, Marques KD, Pacheco MJ, Leles CR.

A question frequently asked in the clinical practice of the professional who treats temporomandibular joint disorders (TMJD) is 'To make the cost/benefit ratio worthwhile for the patient, when should I request a temporomandibular joint (TMJ) computed tomography (CT) or magnetic resonance imaging (MRI)?' To evaluate the evidence of the efficacy of CT and MRI in the diagnosis of disc displacement, local inflammatory disorders, and arthrosis of the TMJ at therapeutic efficacy level, PubMed and Cochrane literature searches with specific indexing terms and a hand search were made.
The literature search yielded 584 titles and abstracts, of which 257 were selected and read in full text. One study was judged relevant. This study evaluated evidence of the efficacy of MRI in the diagnosis of disc position and configuration, disc perforation, joint effusion, and osseous and bone marrow changes in the temporomandibular joint, but no publication reported diagnostic thinking efficacy or therapeutic efficacy.
In conclusion, the absence of studies on the therapeutic efficacy of MRI and CT on TMJD reinforces the need for investment in decision-making studies; meanwhile, sectional imaging tests should be prescribed with caution, especially when health budgets are limited.

Usual Care of TMD

- Oral NSAID or steroid
  - Acute care
- Muscle relaxers
  - Acute care
- Structural insignificance
- Manage yellow flags
- Brace (avoid dependence)
- Functional paradigm

LBP

- Oral NSAID or steroid
  - Acute care
- Muscle relaxers
  - Acute care
- Structural insignificance
- ?
- Splint (avoid dependence?)
- **?**

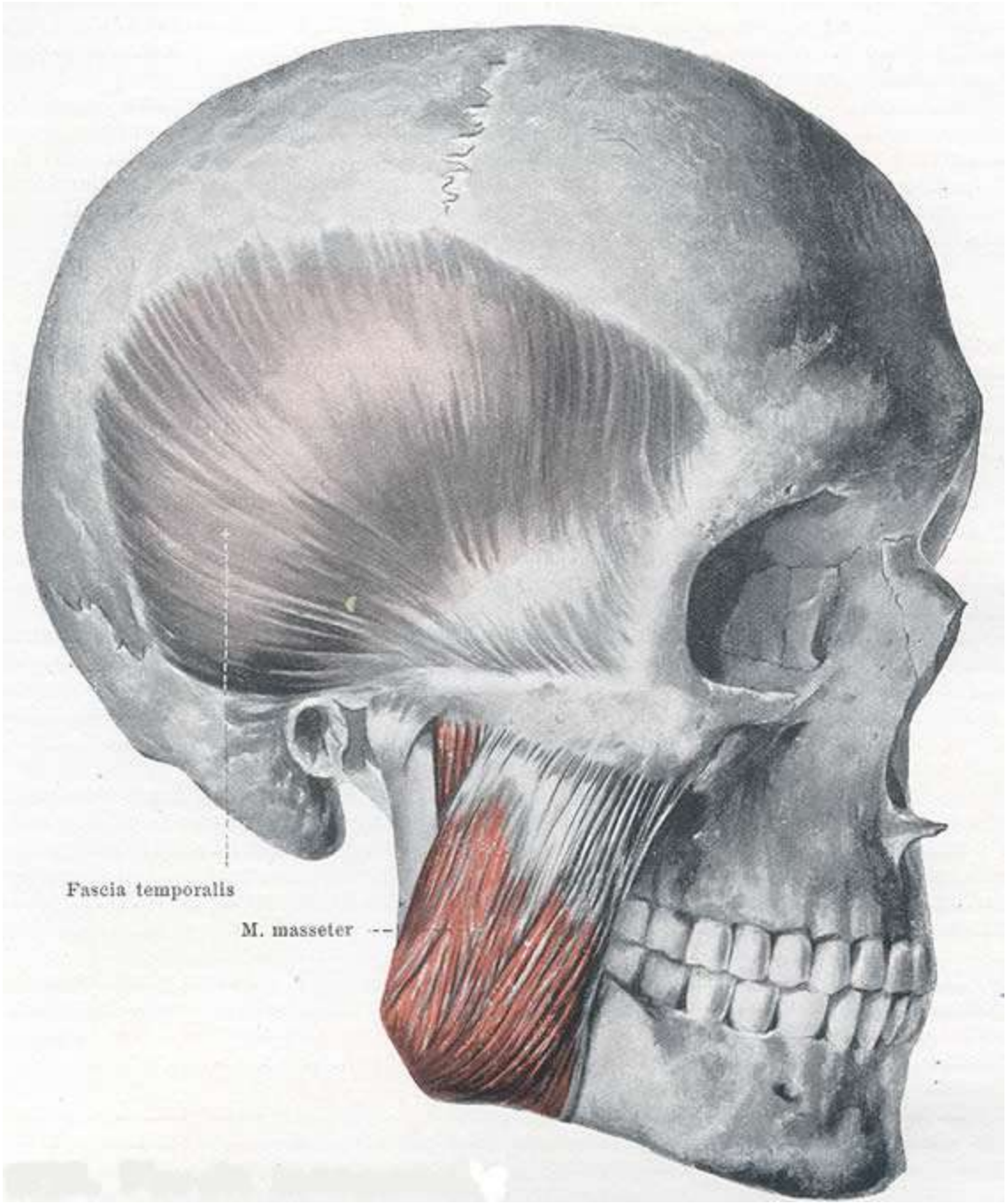
TMD

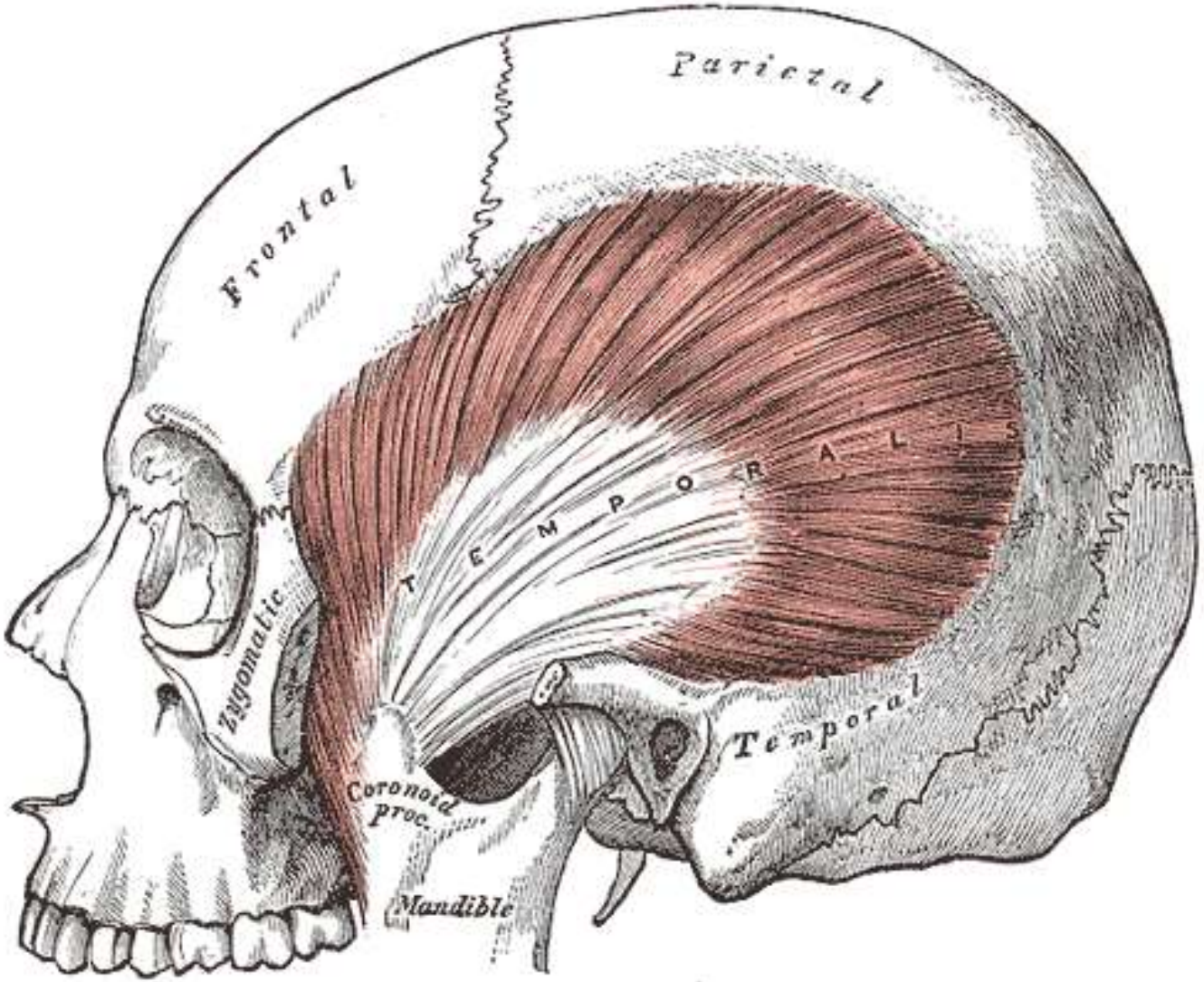
Functional Paradigm

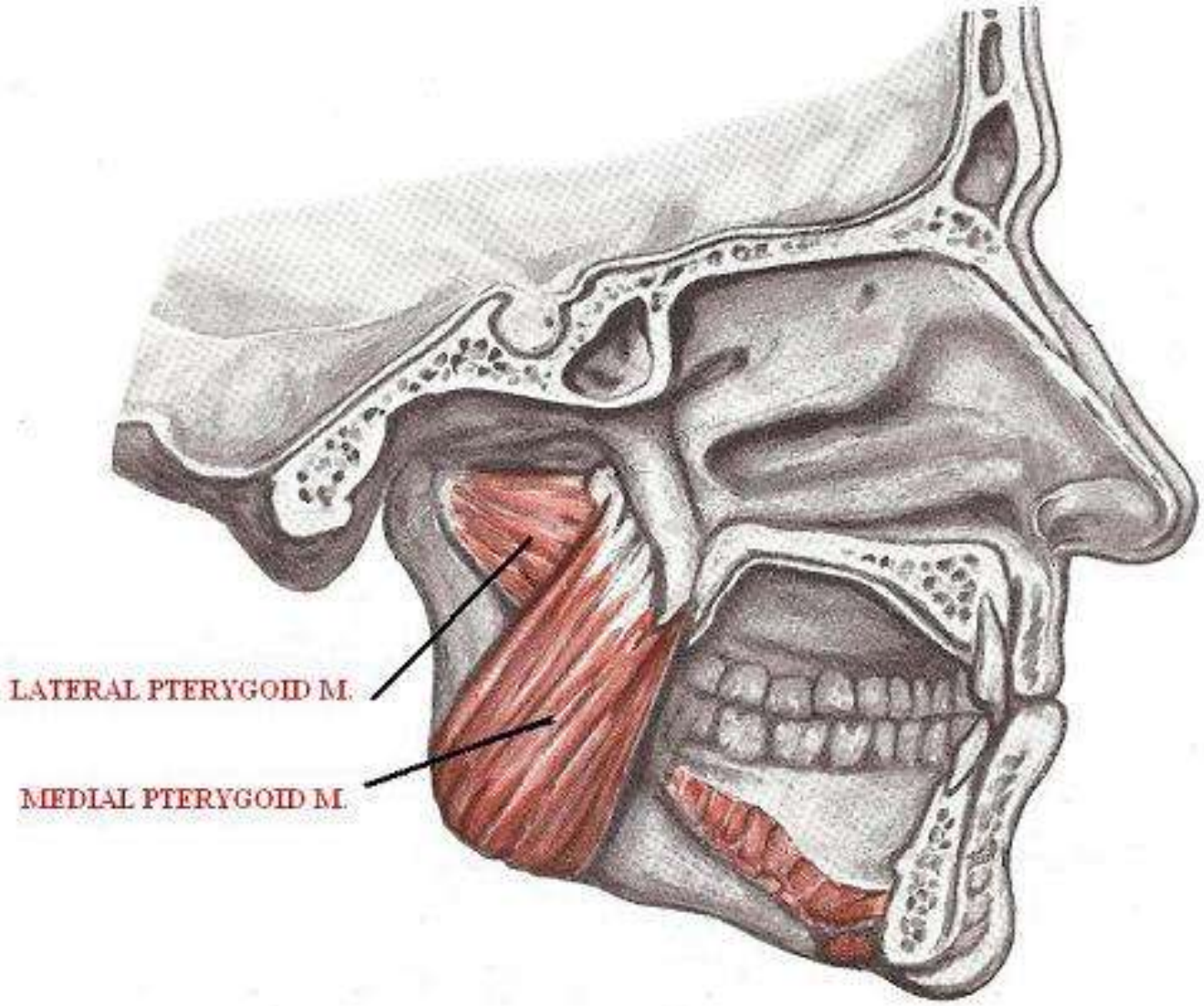
Provider and patient work together to remediate the functional movement impairment, which overloads the pain generator.

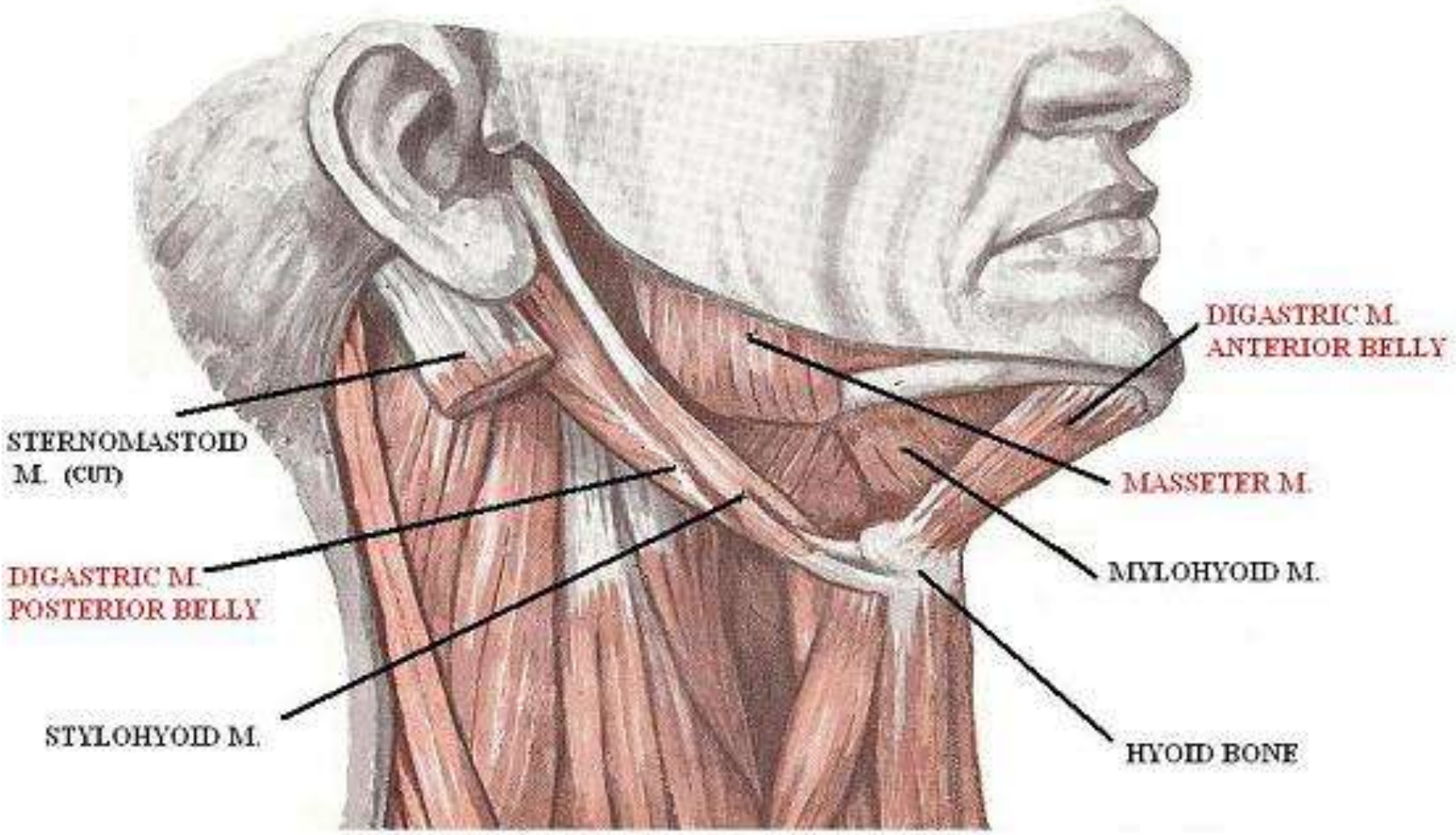
Anatomy

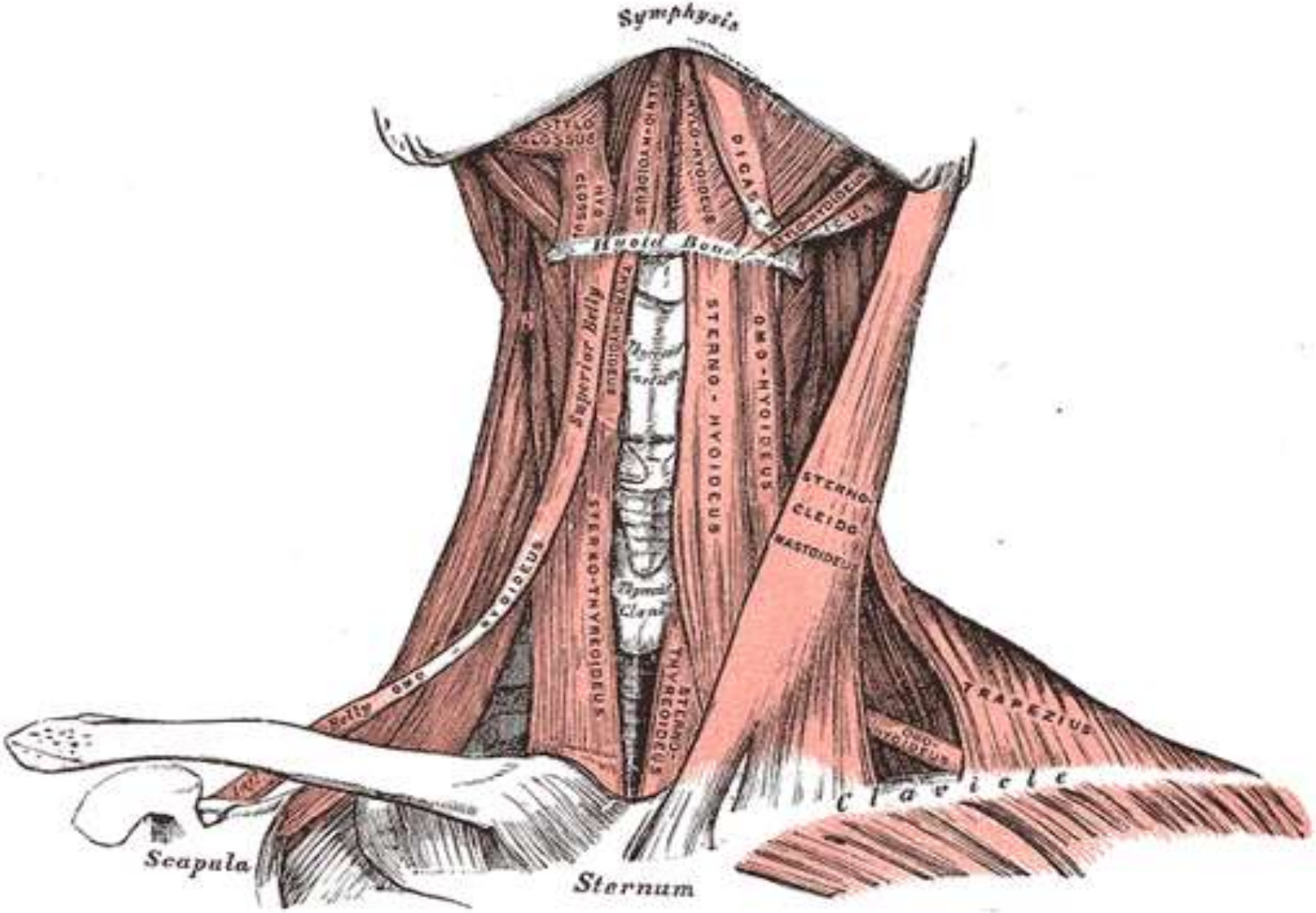
- Articular disc
- Disc-condyle complex
- Masseter
- Medial pterygoid
- Lateral pterygoid (inferior and superior)
- Temporalis
- Suprahyoid group


Fascia temporalis
M. masseter

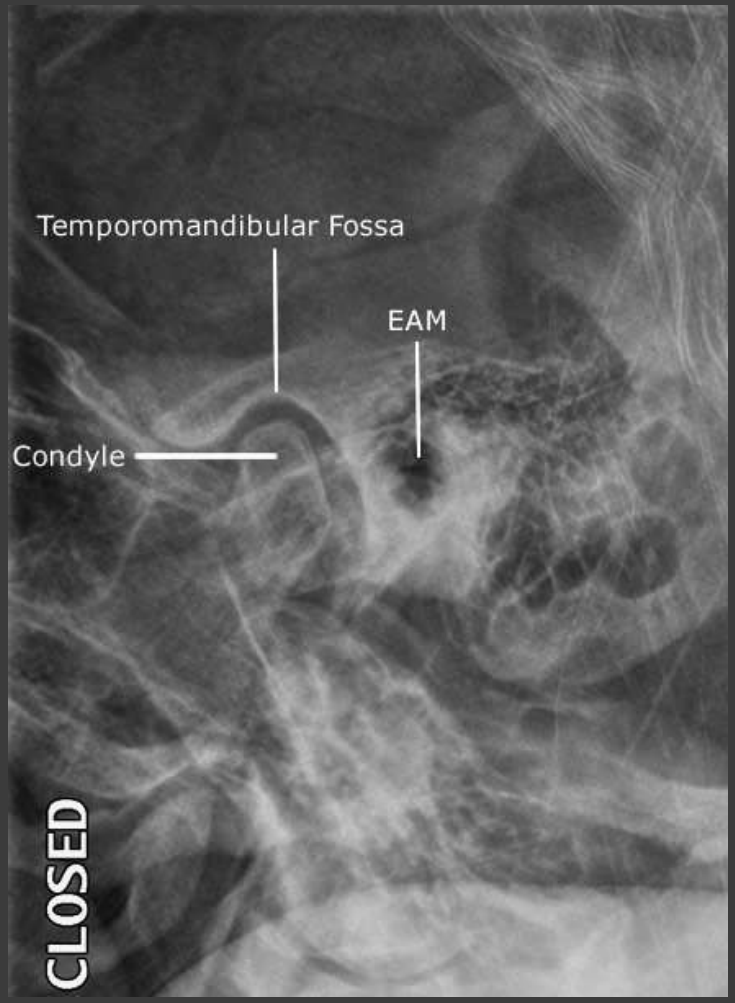

Parietal
Frontal
TEMPORALIS
Zygomatic
Coronoid Proc.
Temporal
Mandible

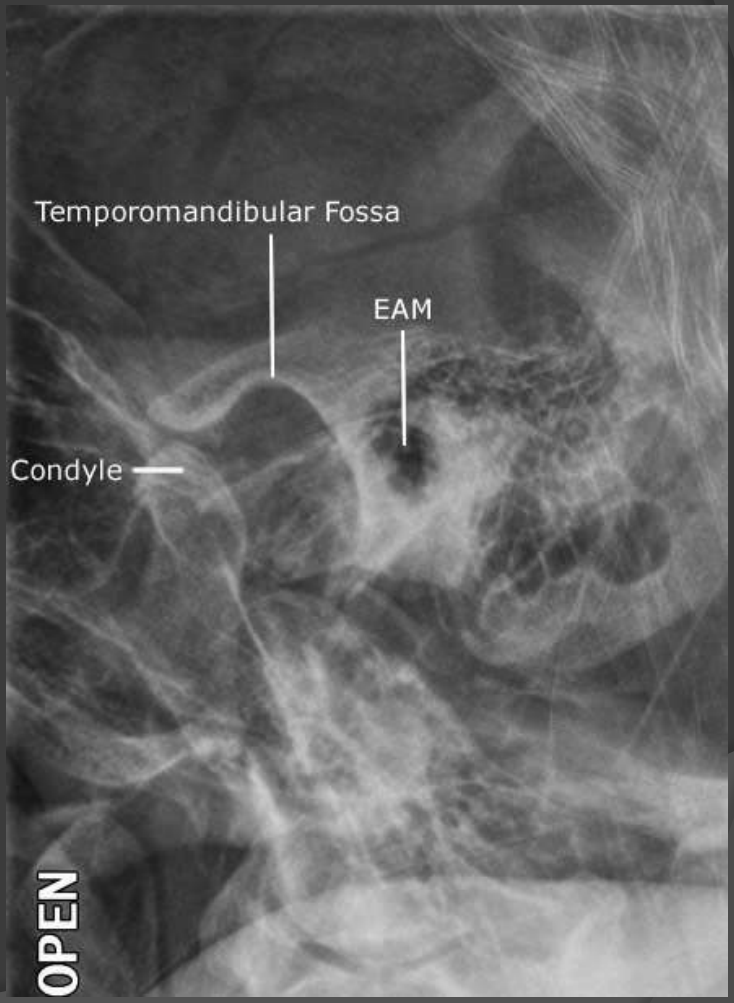

LATERAL PTERYGOID M.
MEDIAL PTERYGOID M.

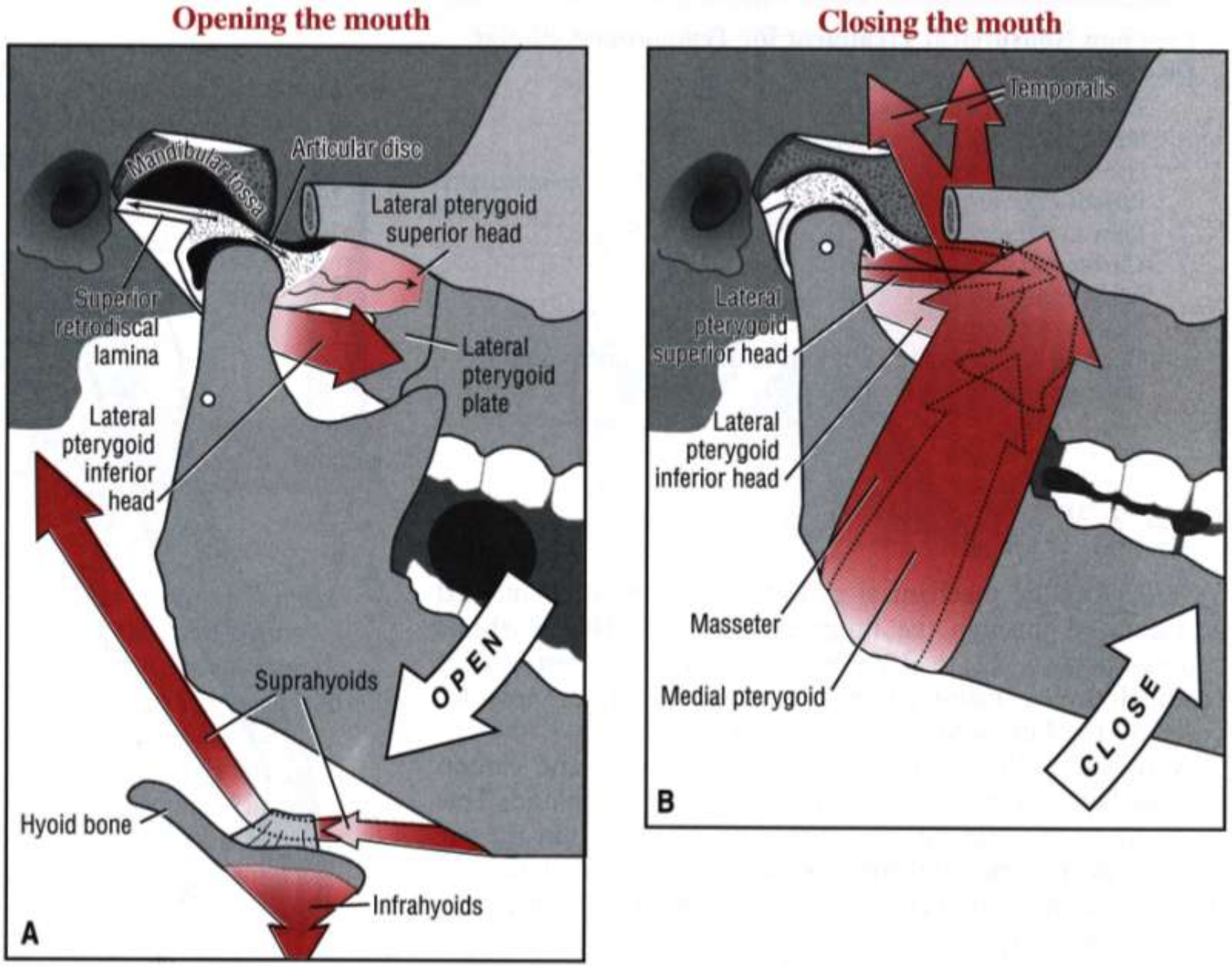

STERNOMASTOID M. (CUT)
DIGASTRIC M. POSTERIOR BELLY
STYLOHYOID M.
DIGASTRIC M. ANTERIOR BELLY
MASSETER M.
MYLOHYOID M.
HYOID BONE


Symphysis
Hyoid Bone
Superior Belly
STERNO-HYOIDEUS
OMO-HYOIDEUS
STERNO-THYREOIDEUS
Thyroid Cartilage
Scapula
Sternum
Clavicle
TRAPEZIUS

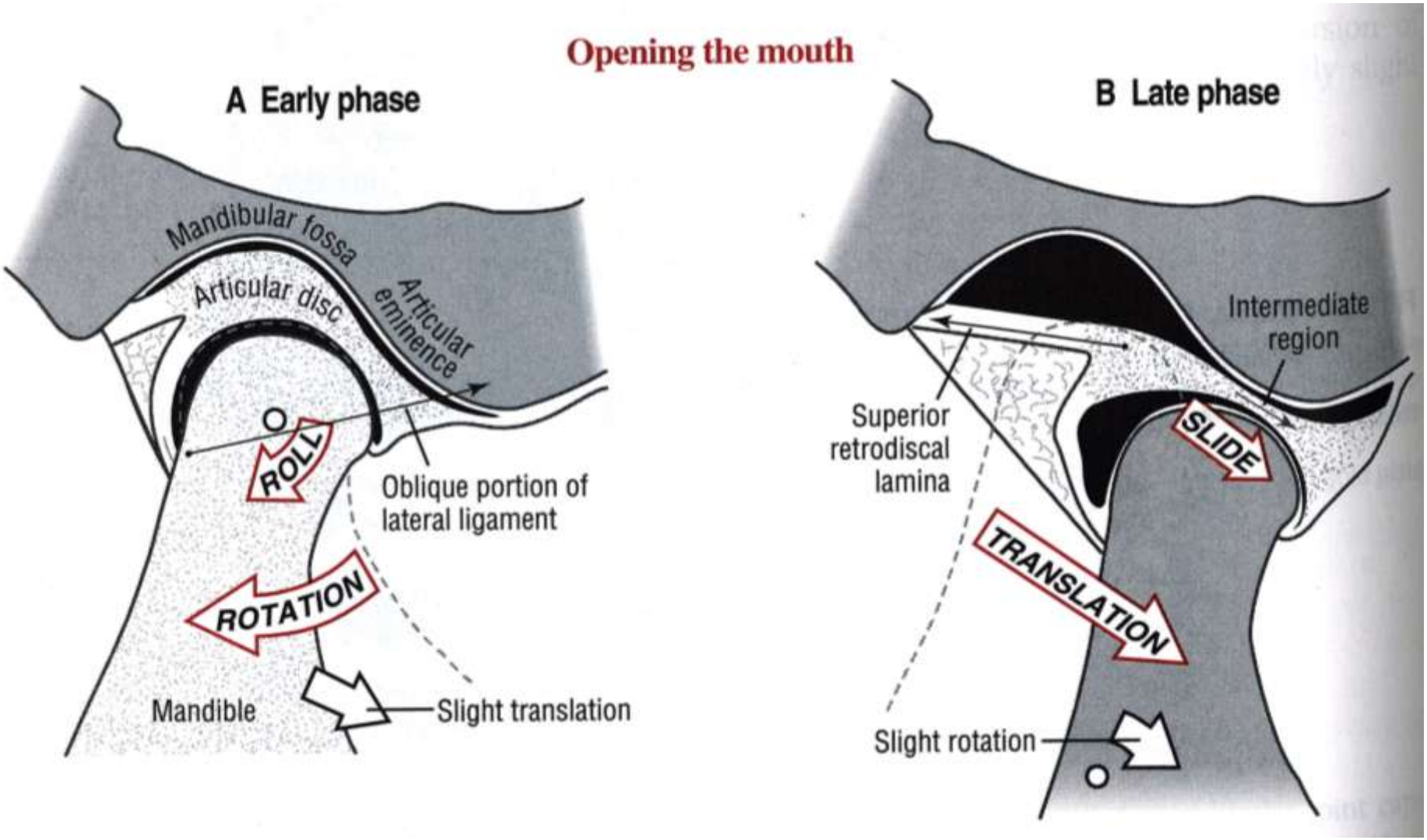
Kinesiology

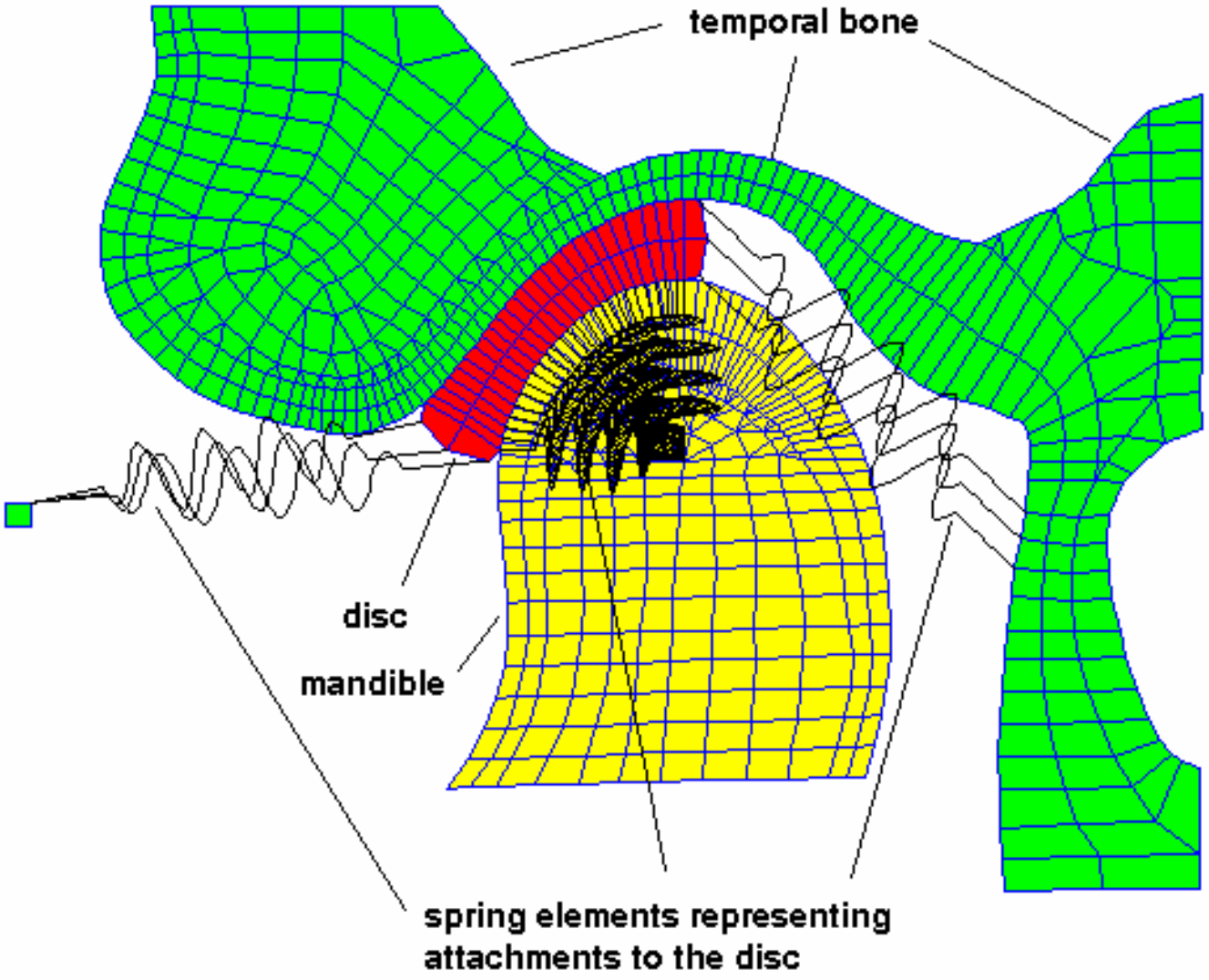





Opening the mouth
Mandibular fossa
Articular disc
Lateral pterygoid superior head
Superior retrodiscal lamina
Lateral pterygoid plate
Lateral pterygoid inferior head
OPEN
Suprahyoids
Hyoid bone
Infrahyoids
A
Closing the mouth
Temporalis
Lateral pterygoid superior head
Lateral pterygoid inferior head
Masseter
Medial pterygoid
CLOSE
B

Opening the mouth




temporal bone
disc
mandible
spring elements representing
attachments to the disc

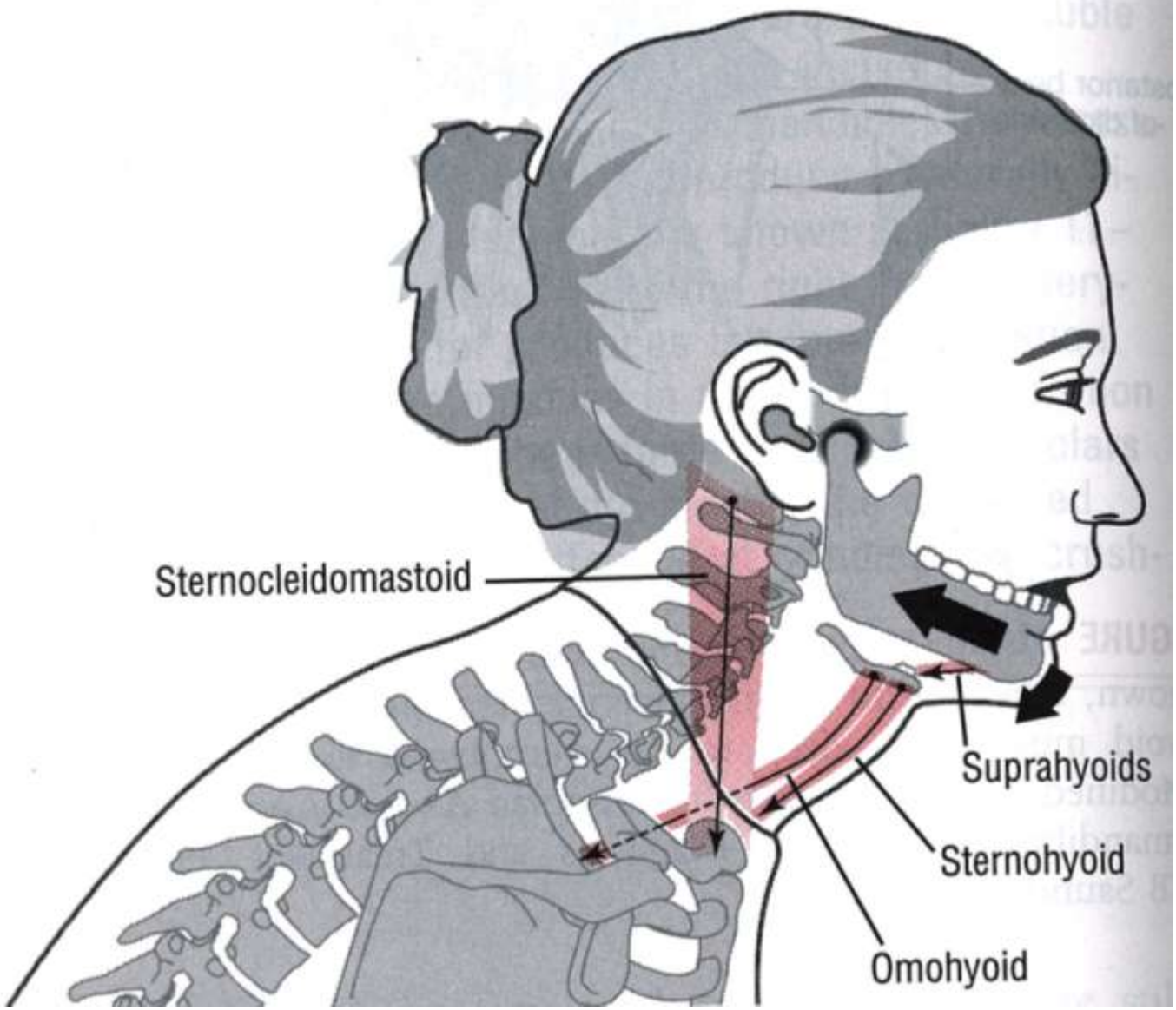
Functional Evaluation

Painful Joints and Key Sources of Biomechanical Overload

- Painful Joints
  - Craniocervical
  - Glenohumoral
  - Upper ribs
  - TMJ
- Faulty Posture
  - Forward head
  - Rounded shoulder
  - Slumped posture
  - Chin poke
- Faulty Pattern
  - Neck flexion
  - Arm abduction
  - Respiration
  - Mouth opening

Liebenson C, Skaggs C, Fonda S, Deily S. Integrated Approach to the Cervical Spine. Rehabilitation of the Spine. 2nd ed.

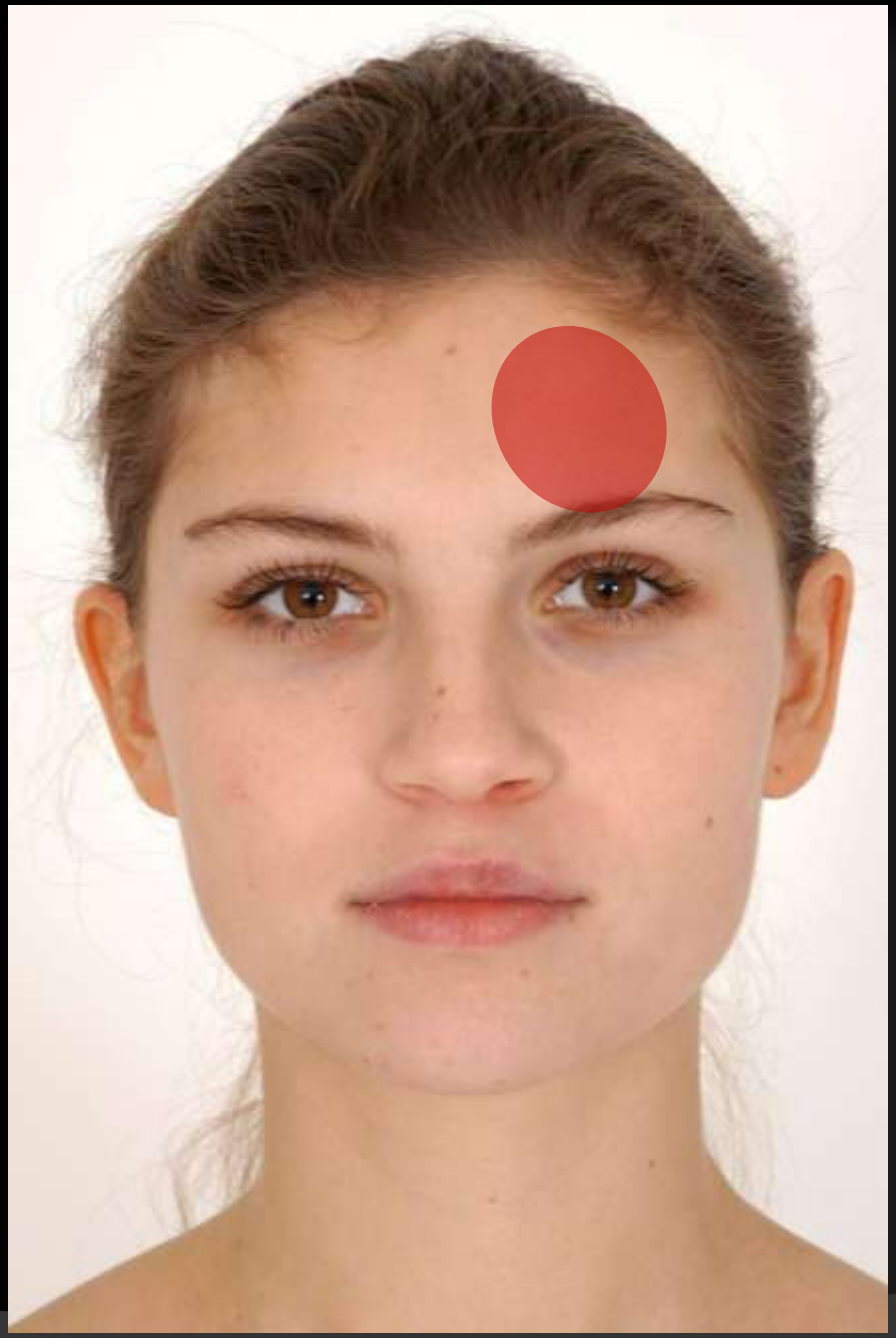
Forward Head Posture

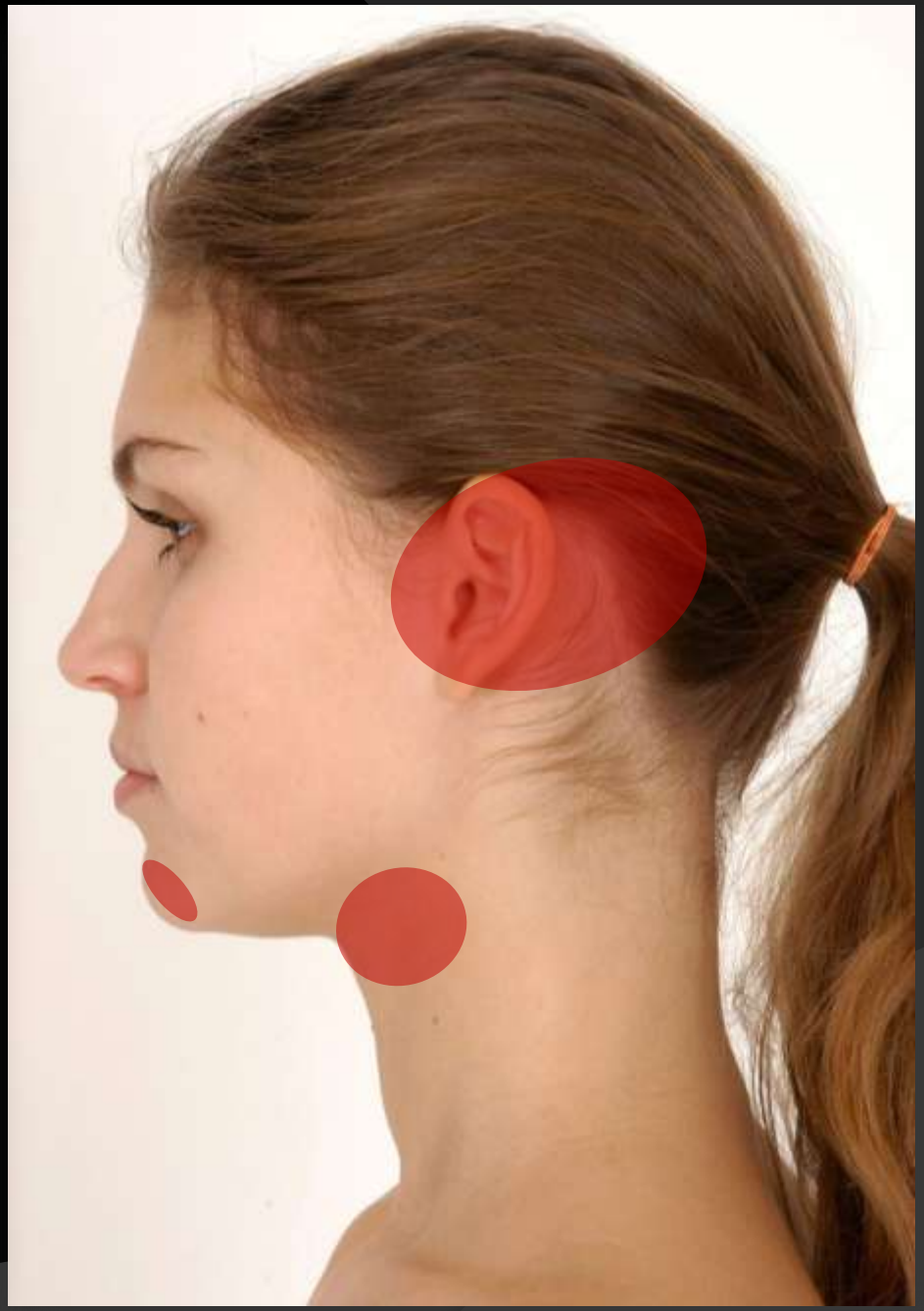


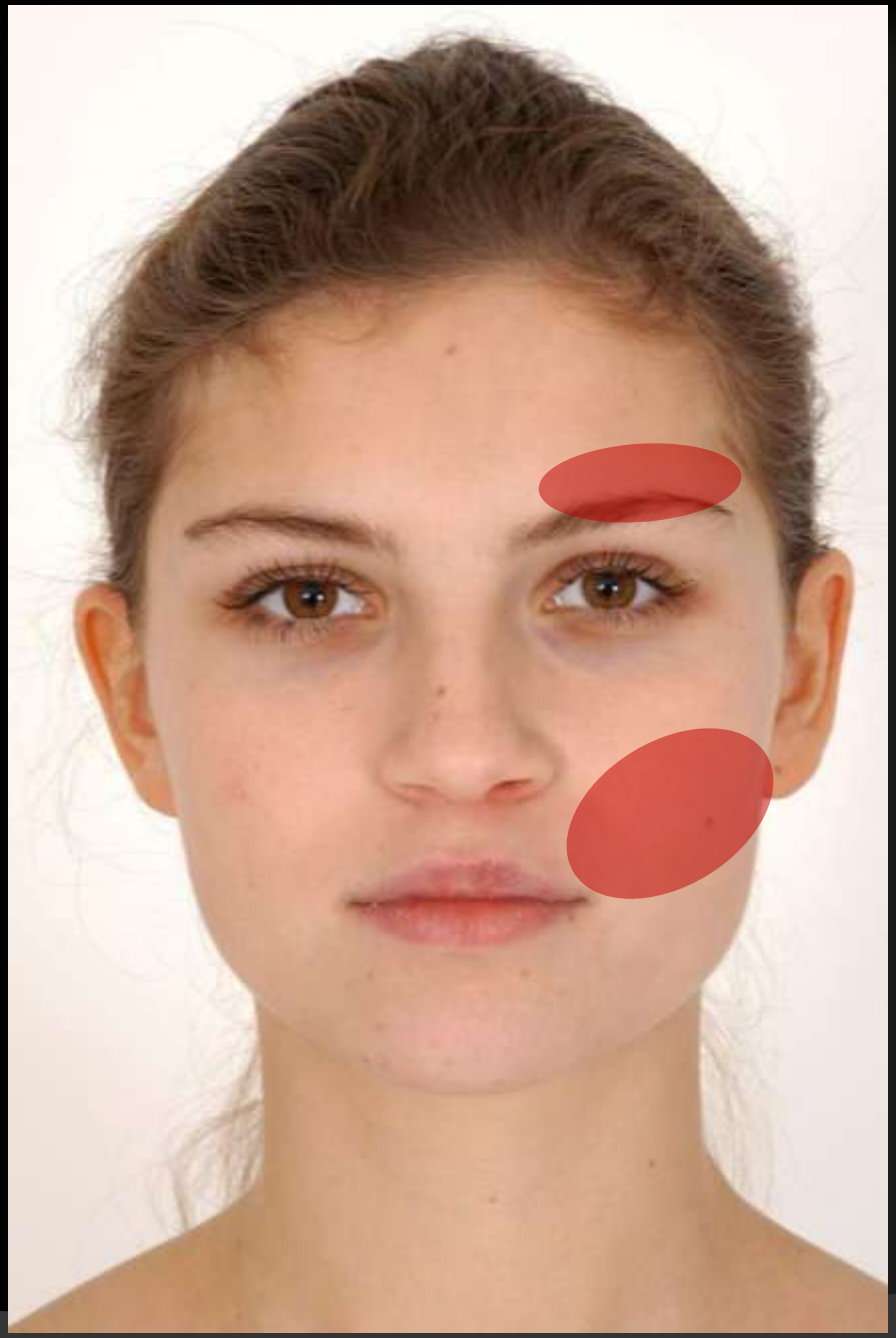
Functional Evaluation

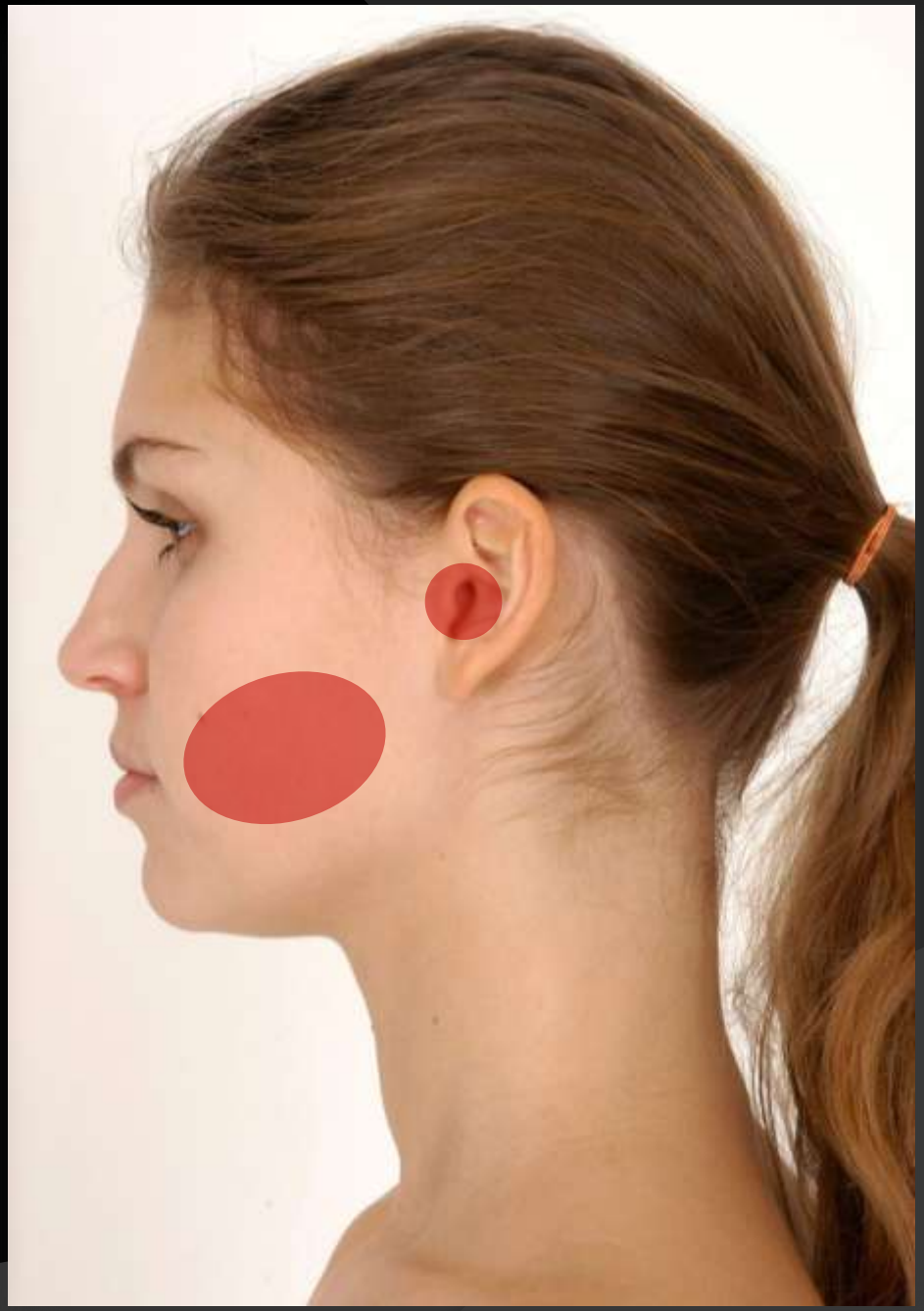
- Mouth opening screen
  - Limited opening
  - Failed retraction
  - Poor suprahyoid action
  - Limited unilateral TMJ motion
- Craniocervical flexion endurance test
  - Chin poke
- Centric-relation provocation testing
  - Rule-out DCC derangement/ inflammation
- Muscular palpation

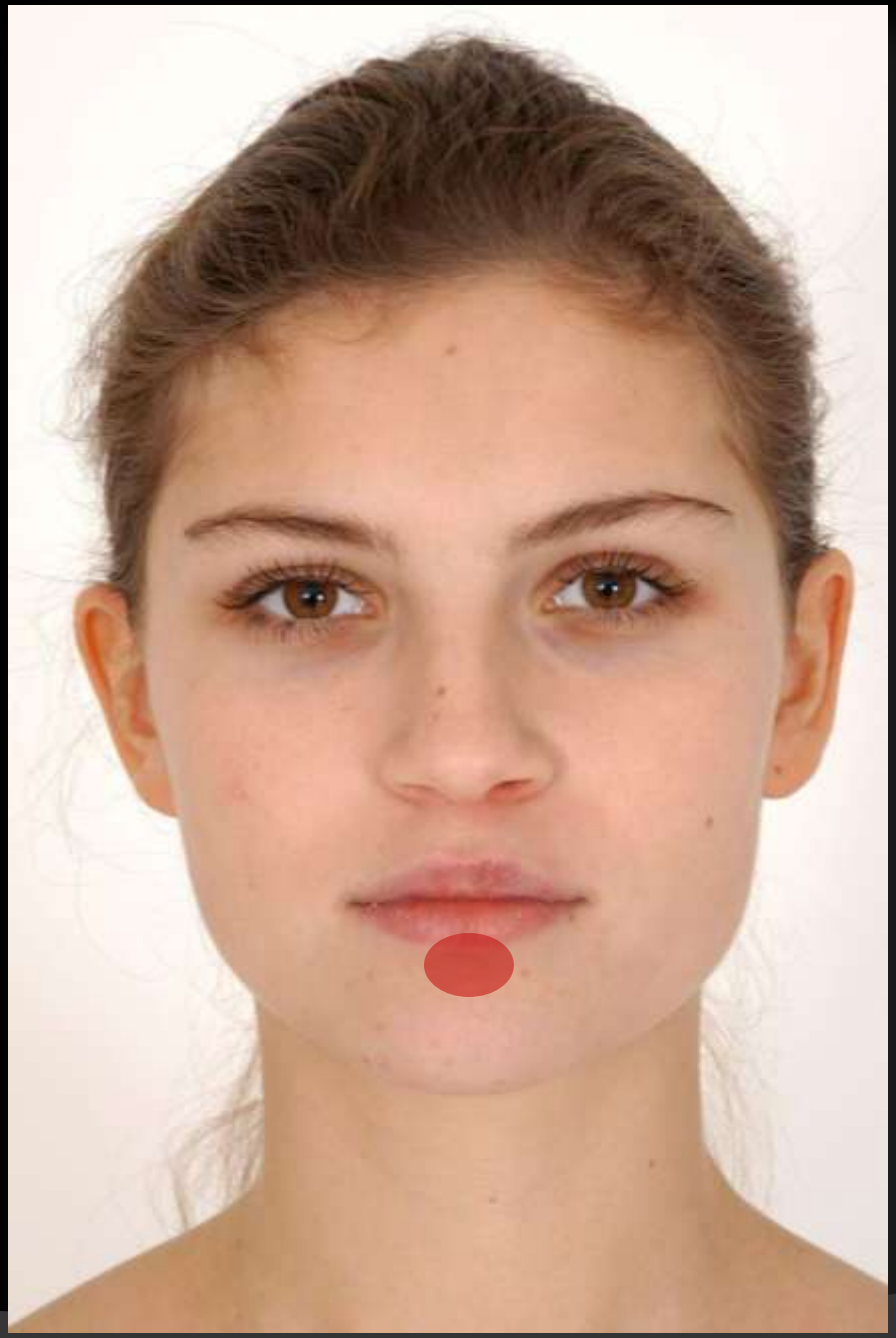
Skaggs C. Temporomandibular Dysfunction: Chiropractic Rehabilitation. J Bodywork Movement Ther. (1997) 1(4), 208-213.

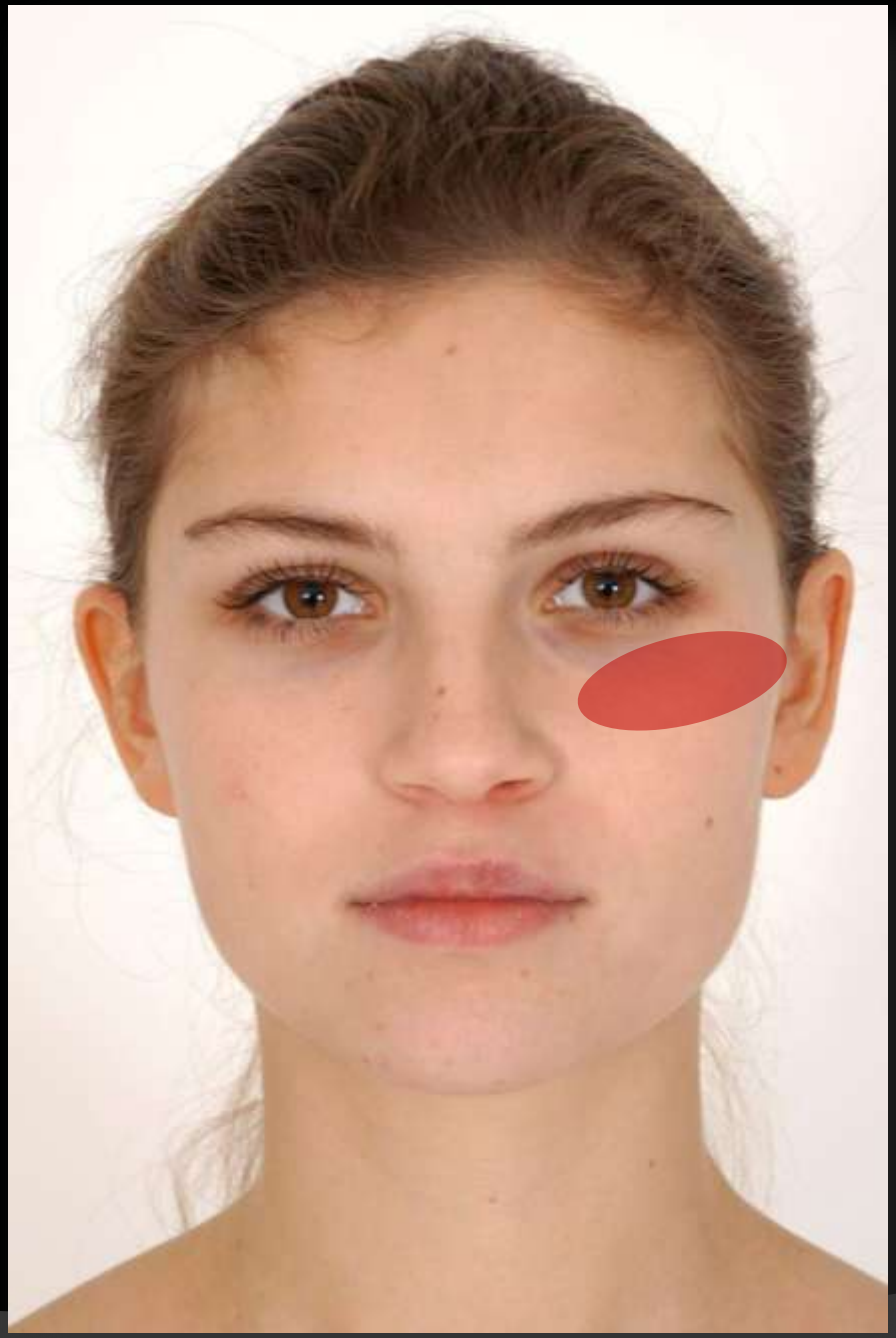


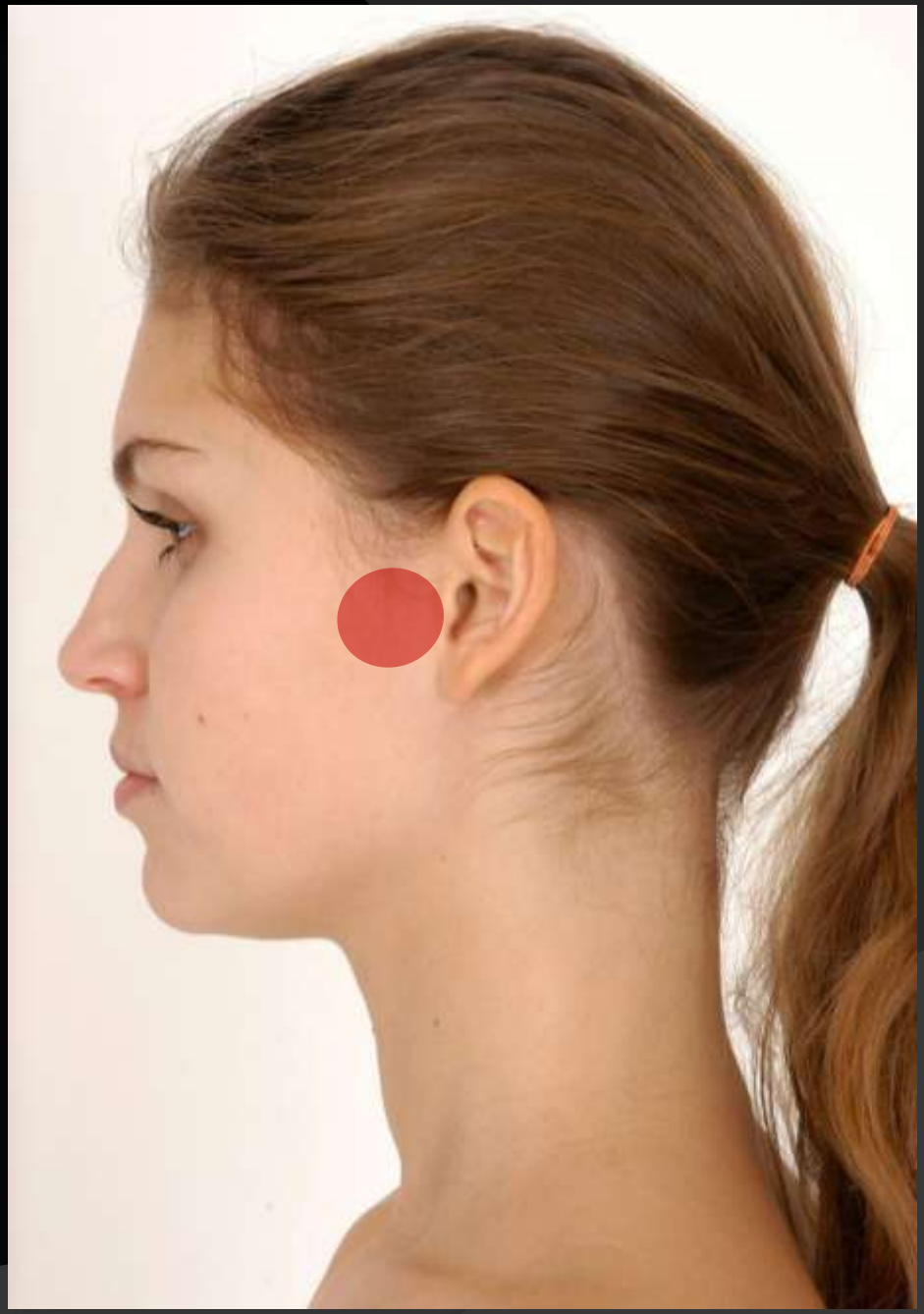


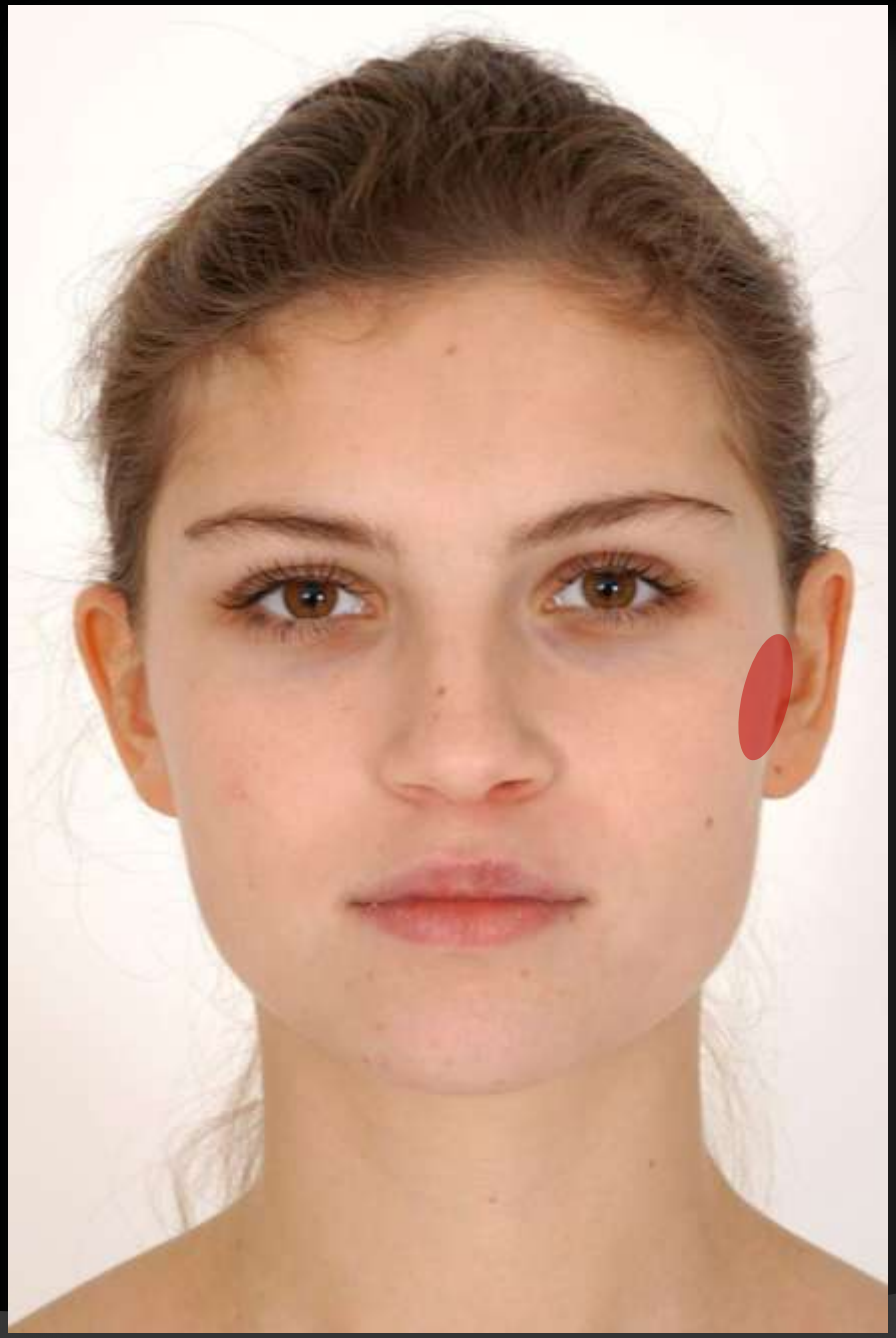






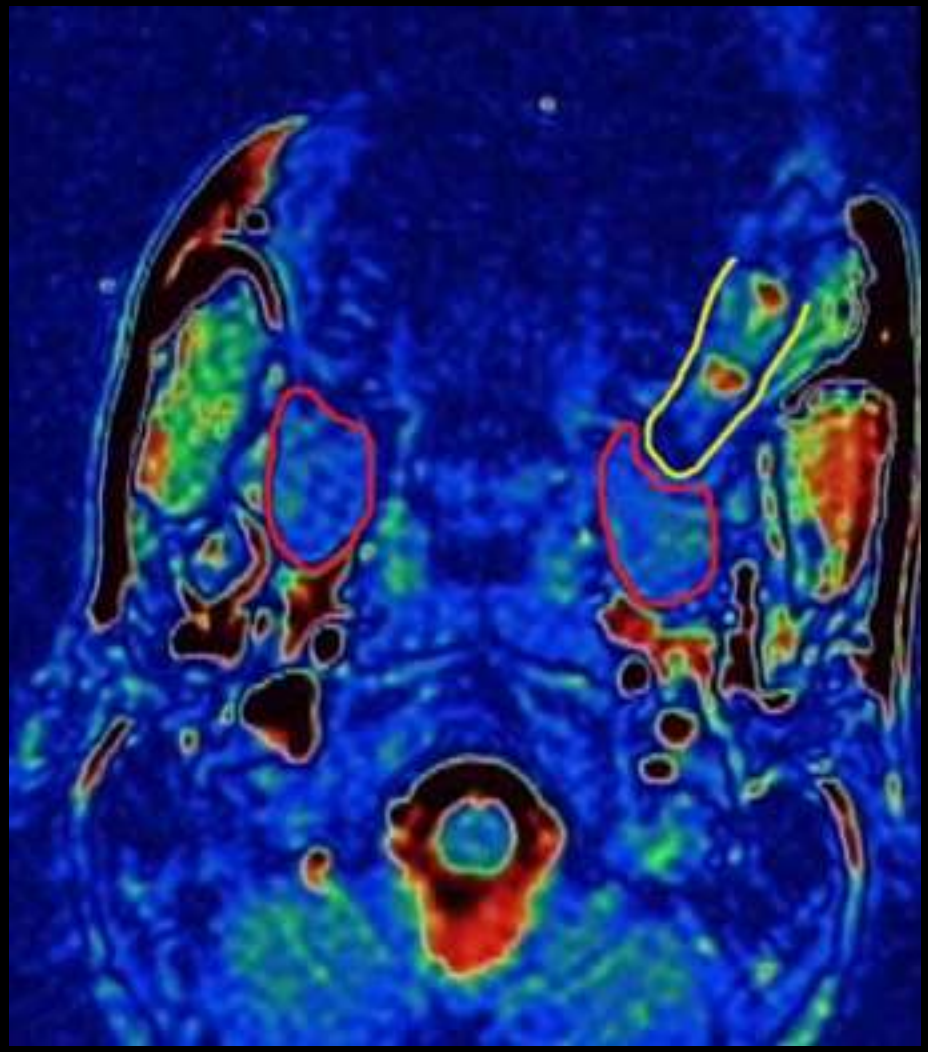






Rehabilitative Intervention

- Post-isometric relaxation
  - Masseter/ medial pterygoid
  - Cranial cervical extensors
  - Anterior digastrics
  - Lateral pterygoid
- Ischemic compression/ myofascial release/ ART/ etc.
  - Above plus lateral pterygoid
- Unilateral TMJ mobilization
- Craniocervical manipulation



Is the lateral pterygoid muscle palpable? A pilot study for determining the possibilities of palpating the lateral pterygoid muscle.
Int Poster J Dent Oral Med 2006, Vol 8 No 01, Poster 301

Self Care

- Avoid pain behavior and catastrophizing
- Tongue rest position
- Suprahyoid activation
- Activation with mouth opening
- Other exercises to unload craniocervical junction, rounded shoulders, etc.