TREATMENT OF DISC DISPLACEMENT WITH REDUCTION & BILATERAL MASTICATORY MYALGIA

Group 8A-4
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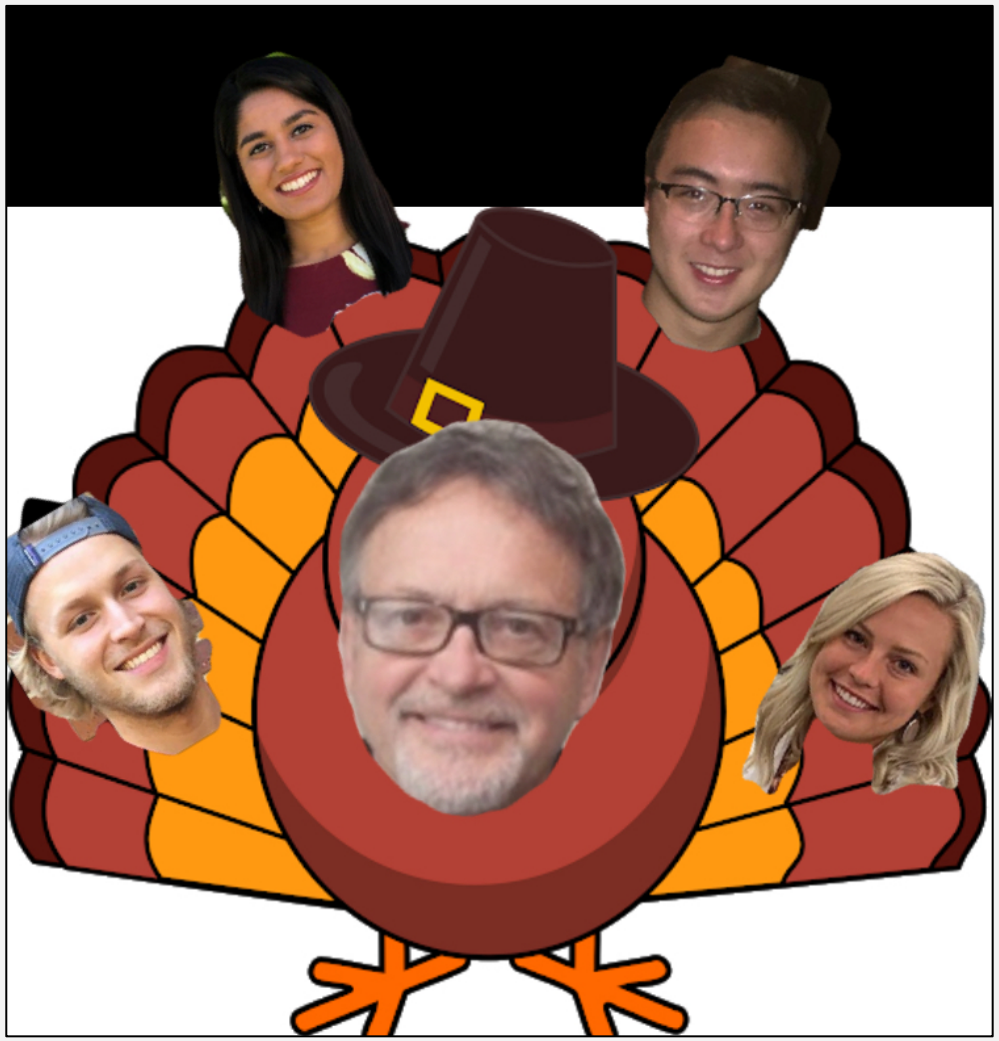
D2: Julia Snell
D1: Trevor Hine

November 18th, 2020

ROUNDS TEAM

- **Group Leader: Dr. Toburen**
- **Specialty Leader: Dr. Waliszewski**
- **Project Team Leader: Jayna Shah**
- **Project Team Participants: Dave Wertz, Julia Snell, Trevor Hine**



PATIENT: MS. JS

- Age: 43-year-old
- Gender: Female
- Ethnicity: Caucasian
- Chief Complaint: "I often get headaches/migraines in the morning in the areas of my temples, neck, and mostly the jaws. The muscles are frequently sore and stiff"

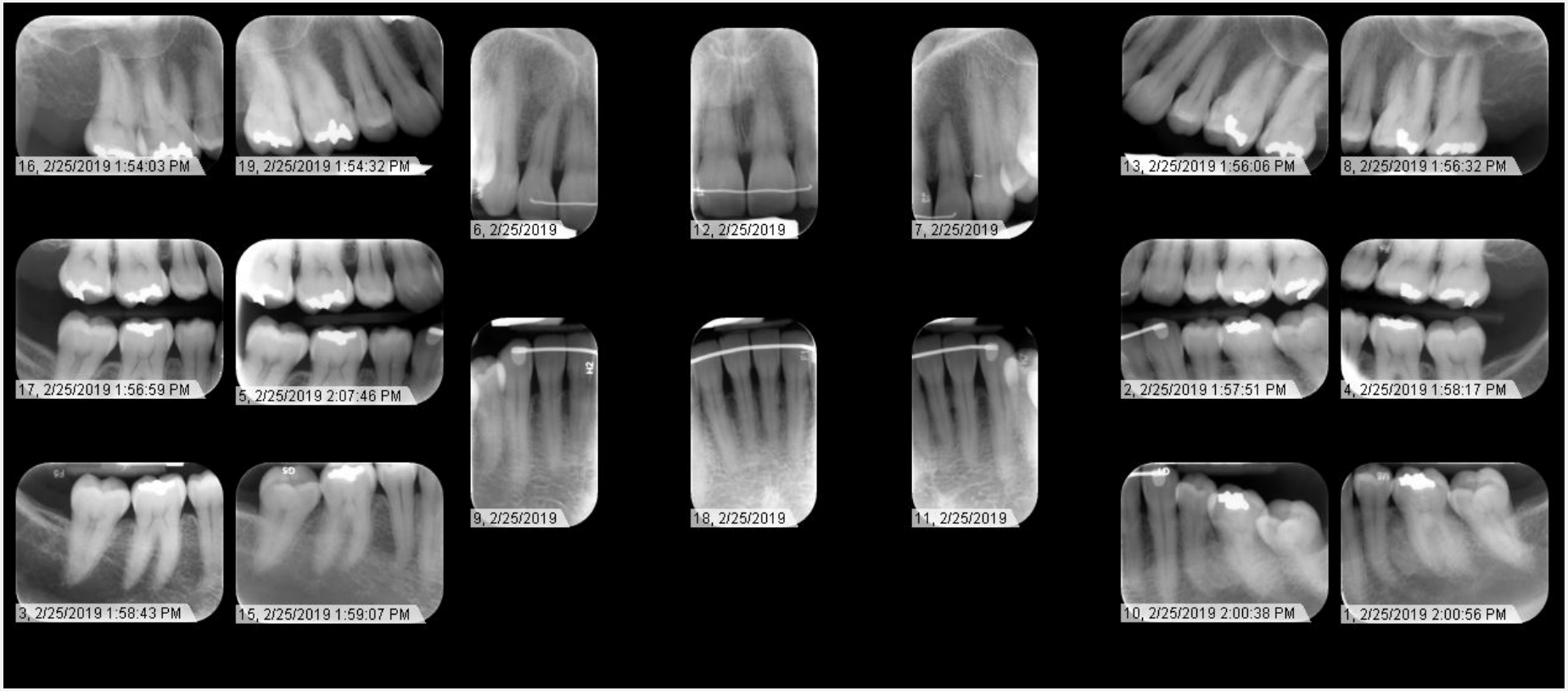
MEDICAL HISTORY

- Patient has muscle spasms on left shoulder and was given steroids and muscle relaxers for one week in March 2020 – pain subsided.
- **Medications:**
  - 10mg Cyclobenzaprine – as needed for TMD
  - Vitamin D3
  - Magnesium
  - Biotin

DENTAL HISTORY

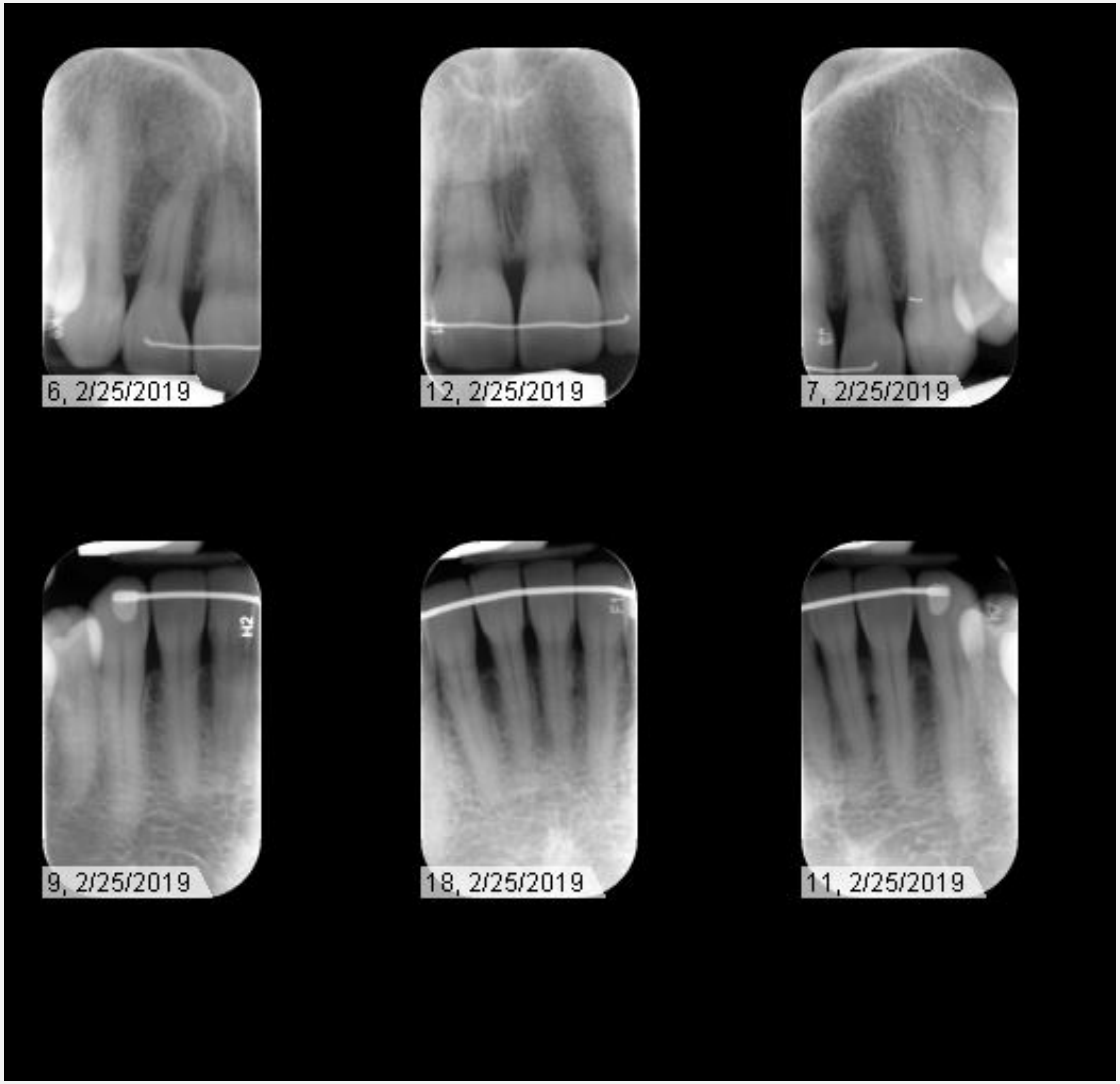
- Completed orthodontic treatment in teenage years
- Extractions of 2nd premolars during orthodontic treatment
- Previous amalgam/resin restorations and sealants:
  - #2, #3, #14, #15, #18, #19, #30
  - #28, #31 sealants
- History of TMD

RADIOGRAPHS - FMX



RIGHT POSTERIOR RADIOGRAPHS

ANTERIOR RADIOGRAPHS



RIGHT POSTERIOR RADIOGRAPHS

RADIOGRAPHIC FINDINGS

- After POE on 11/03/2020, found mesial caries #12 as seen on radiographs

2/25/2019

11/03/2020

CLINICAL FINDINGS

Restorations:

- Amalgam - #2 OL, #3 OL, #14 OL, #15 OL, #19 O, #30 O
- Resin - #18 OL
- Sealants - #28 O, #31 O

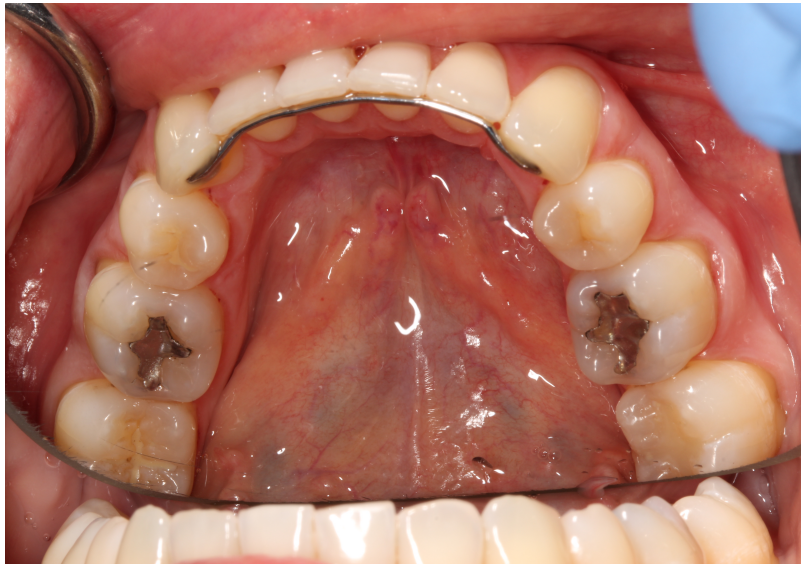
New findings:

- Fractured amalgam #30 occlusal
- Mesial caries #12

CLINICAL FINDINGS

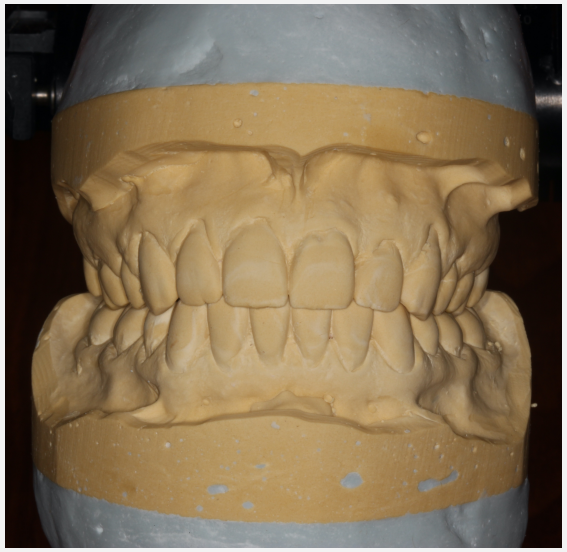
- Clicking of left TMJ upon closing of the mandible
- Class I molar and canine occlusion
- Bilateral canine guidance

CLINICAL FINDINGS - INTRAORAL



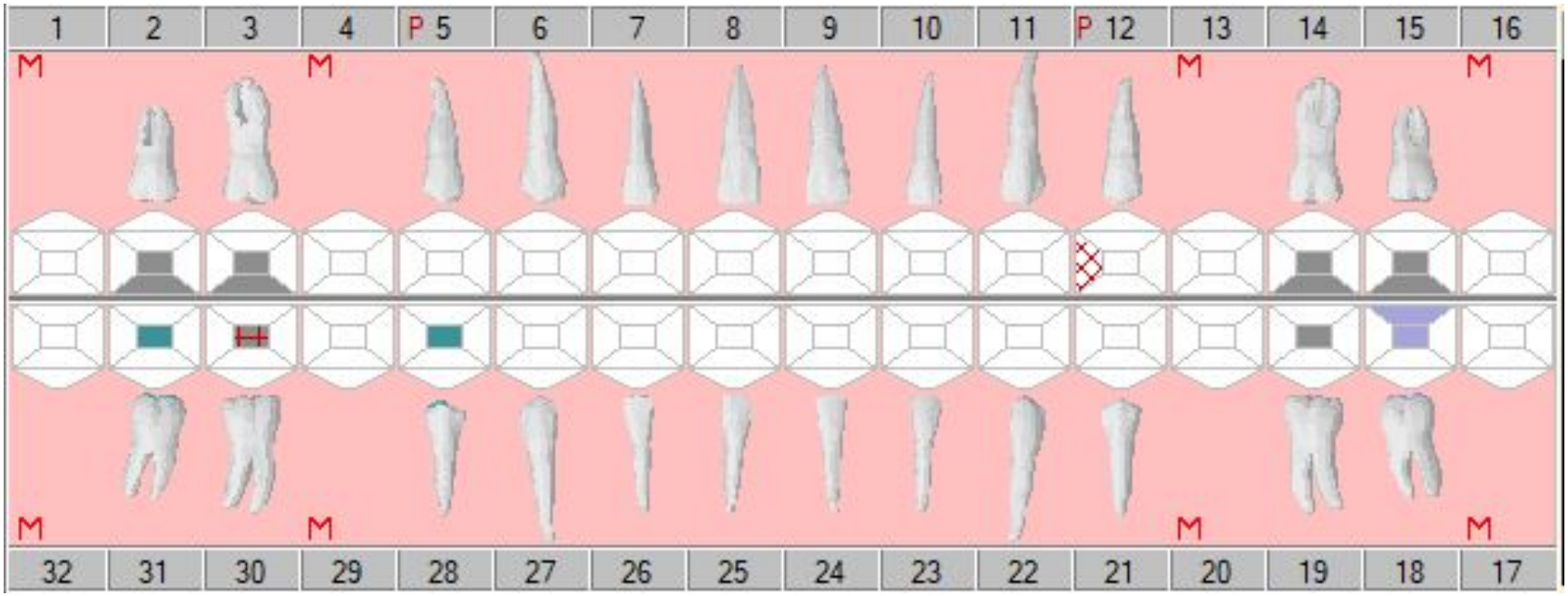
CLINICAL FINDINGS - INTRAORAL

CLINICAL FINDINGS - CASTS



SPECIFIC FINDINGS

- Clicking of left TMJ upon closing of the mandible



ODONTOGRAM

Odontogram updated 11/03/20

PERIODONTAL CHARTING

																MOBILITY
																FURCA
	P	P P		P			P			P P	P P		P P P	P		PLAQUE
																BOP
	4 4 4	5 5 5		4 4 4	3 3 3	3 3 3	4 4 4	4 4 4	4 4 4	3 3 3	4 4 4	5 5 5	5 5 5	5 5 5		MGJ
	4 3 3	3 4 3		4 2 3	2 2 2	3 4 2	2 2 3	3 2 2	2 2 3	2 3 4	3 3 5		3 2 3	3 2 3		CAL
	3 2 3	3 3 3		4 2 3	2 1 2	3 2 2	2 1 3	3 1 2	2 1 3	2 1 3	3 2 4		3 2 3	3 2 3		P.D.
	1 1 0	0 1 0		0 0 0	0 1 0	0 2 0	0 1 0	0 1 0	0 1 0	0 2 1	0 1 1		0 0 0	0 0 0		FGM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	0 0 0	0 0 0		0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	0 0 0		FGM
	3 2 3	3 1 2		2 2 3	2 2 3	3 1 3	3 1 3	2 1 3	2 2 2	3 2 3	3 1 2		3 1 3	3 2 3		P.D.
	3 2 3	3 1 2		2 2 3	2 2 3	3 1 3	3 1 3	2 1 3	2 2 2	3 2 3	3 1 2		3 1 3	3 2 3		CAL
																MGJ
																BOP
																PLAQUE
																FURCA
																PROGNOSI

																PROGNOSI
																FURCA
	P	P P														PLAQUE
																BOP
	5 5 5	5 5 5		5 5 5	4 4 4	4 4 4	4 4 4	4 4 4	4 4 4	5 5 5	5 5 5		5 5 5	5 5 5		MGJ
	3 3 3	3 3 3		3 2 3	2 1 2	3 1 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 3		3 2 3	3 2 3		CAL
	3 3 3	3 3 3		3 2 3	2 1 2	3 1 2	2 1 2	2 1 2	2 1 2	2 2 2	2 2 3		3 2 3	3 2 3		P.D.
	0 0 0	0 0 0		0 0 0	0 0 0	0 0 0	0 1 0	0 1 0	0 1 0	0 0 0	0 0 0		0 0 0	0 0 0		FGM
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	
	0 2 1	1 2 0		1 2 0	1 1 1	1 1 1	1 2 1	1 1 0	0 0 0	0 0 0	0 1 0		2 1 0	1 1 1		FGM
	3 1 2	2 2 3		3 1 2	3 1 2	2 1 2	2 1 2	2 1 2	2 1 2	3 1 2	2 2 3		2 2 2	3 2 3		P.D.
	3 3 3	3 4 3		4 3 2	4 2 3	3 2 3	3 3 3	3 2 2	2 1 2	3 1 2	2 3 3		4 3 2	4 3 4		CAL
	3 3 3	3 3 3		2 2 2	2 2 2	2 2 2	2 2 2	3 3 3	3 3 3	3 3 3	4 4 4		3 3 3	3 3 3		MGJ
																BOP
							P P	P P	P P	P						PLAQUE
																FURCA
																MOBILITY

ADA Class I - Gingivitis

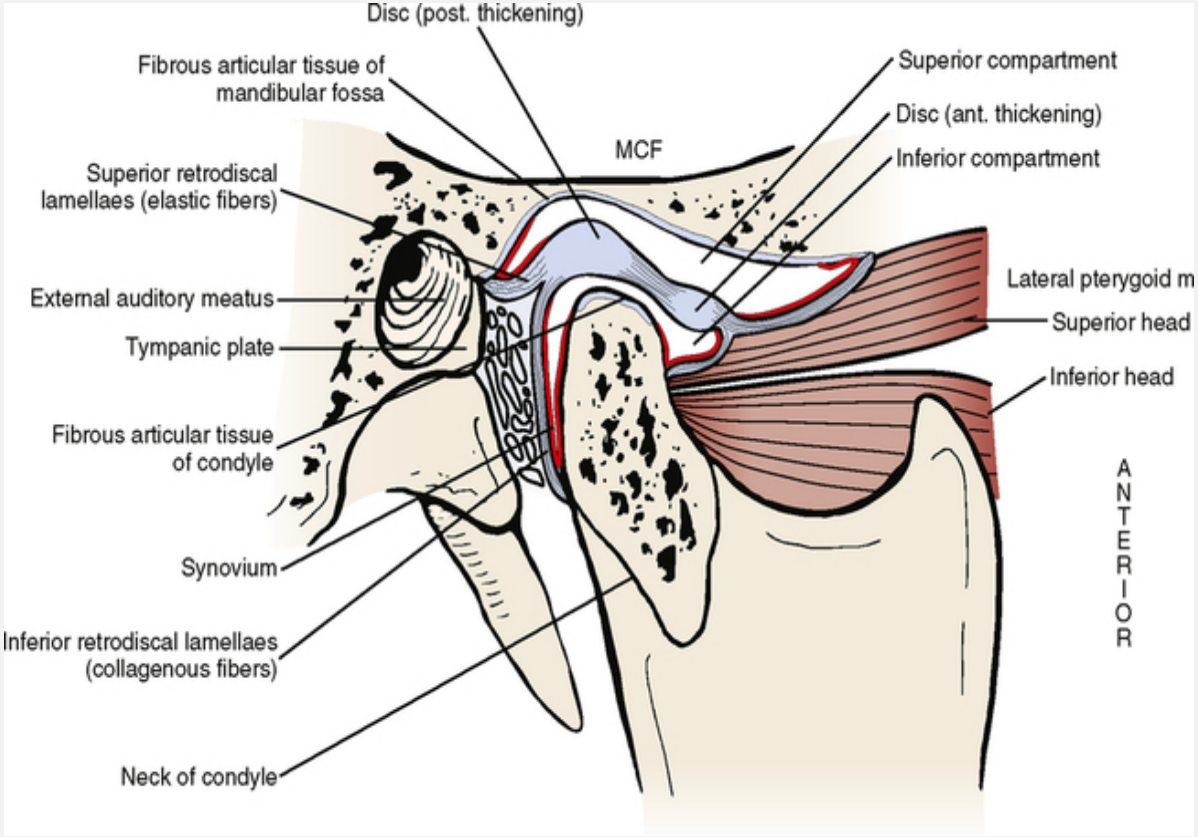
DIAGNOSIS

- Disc displacement with reduction
- Bilateral masticatory myalgia

PROBLEM LIST

- TMD
- Headaches/Migraines
- Caries

D1: ANATOMY OF THE TEMPOROMANDIBULAR JOINT



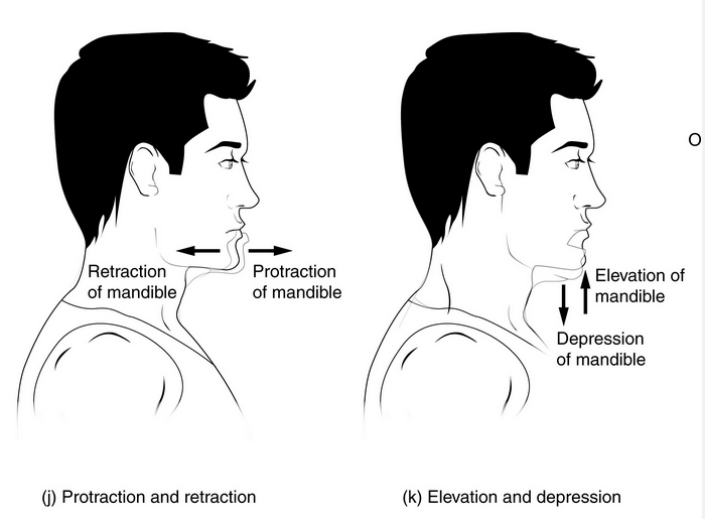
Articular disc- Anterior and posterior thickenings separated by a central region made of fibrocartilage

Inferior compartment- allows for hinge motion

Superior Compartment- allows for sliding motion

Joint capsule- fibrous connective tissue that attaches the articular eminence, the articular disc as well as the neck of the condyle

MUSCLES AND LIGAMENTS INVOLVED WITH THE TMJ

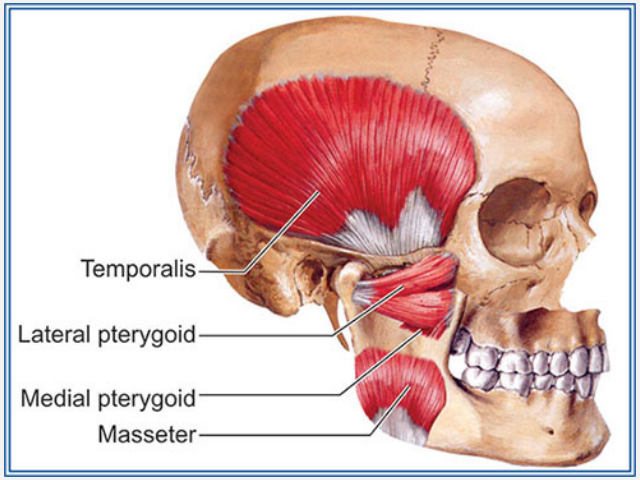


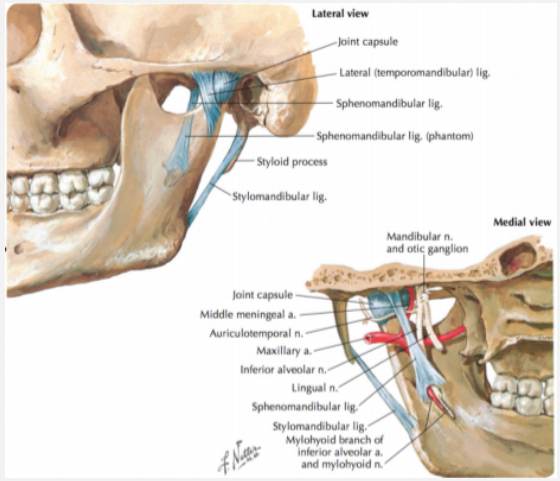
Elevation of the mandible - masseter, medial pterygoid, temporalis muscles

Depression - lateral pterygoid muscle

Protrusion - lateral pterygoid muscles

Retrusion - posterior horizontal fibers of the temporalis, deep fibers of the masseter muscle





3 Ligaments involved:

- Temporomandibular (lateral)
- Sphenomandibular
- Stylomandibular

D2 PATHOLOGY - TEMPOROMANDIBULAR JOINT ANTERIOR DISC DISPLACEMENT

- One of the most common TMJ disorders
- An abnormal relationship between the articular disc, the mandibular condyle and the mandibular fossa
- Often presents with clicking, joint pain, a limited range of mouth opening, and masticatory difficulty

(Young, A. 2015)

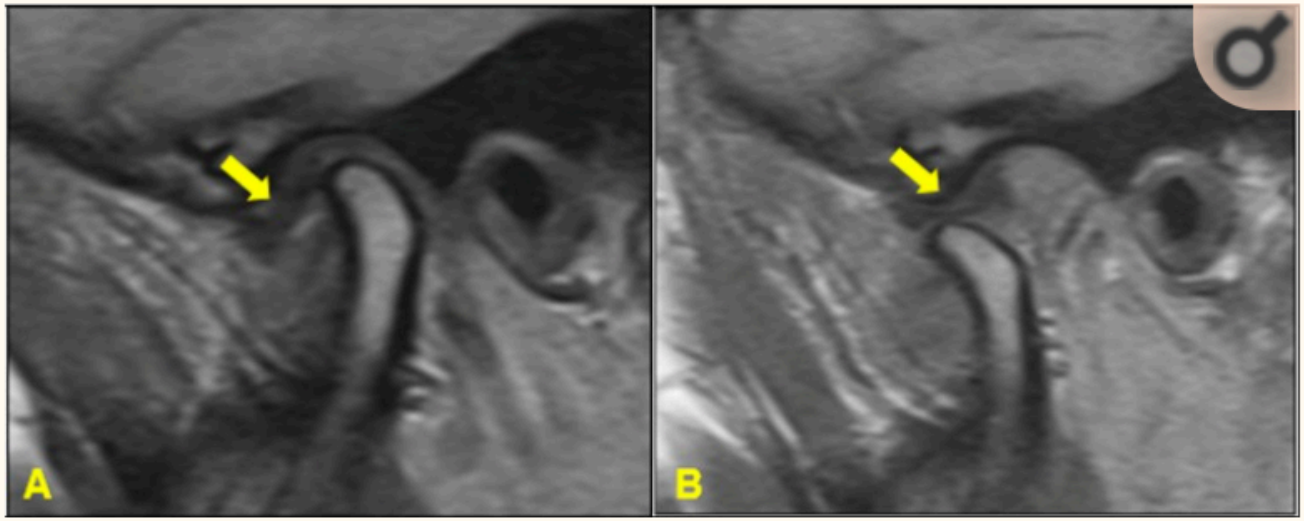


Figure 1

Disc displacement with reduction (DDWR). A: Closed mouth, the articular disc (yellow arrow) is anteriorly displaced in relation to the condyle; B: Open mouth, the disc (yellow arrow) returns to the intermediate area

- **Disc displacement with reduction (DDWR)**: The articular disc displaces anteriorly to the condylar head, when the mouth is opened the disc relocates on the the condylar head

(Young, A. 2015)

WHAT CAUSES ANTERIOR DISC DISPLACEMENT?

- **Caused by trauma to the jaw or joint - chronic (microtrauma) or acute injuries (macrotrauma)**
  - abnormal biomechanical forces applied to the mandibular condyle, which alter the shape and function of the articular tissues.
  - shape and/or dynamic properties alterations of the TMJ components,
  - lack of lubrication
  - degenerative articular disorder
  - occlusal abnormalities
  - thinning of the posterior border of the disc - displacement in a more anterior position
  - TMJ hypermobility/excessive opening of the TMJ

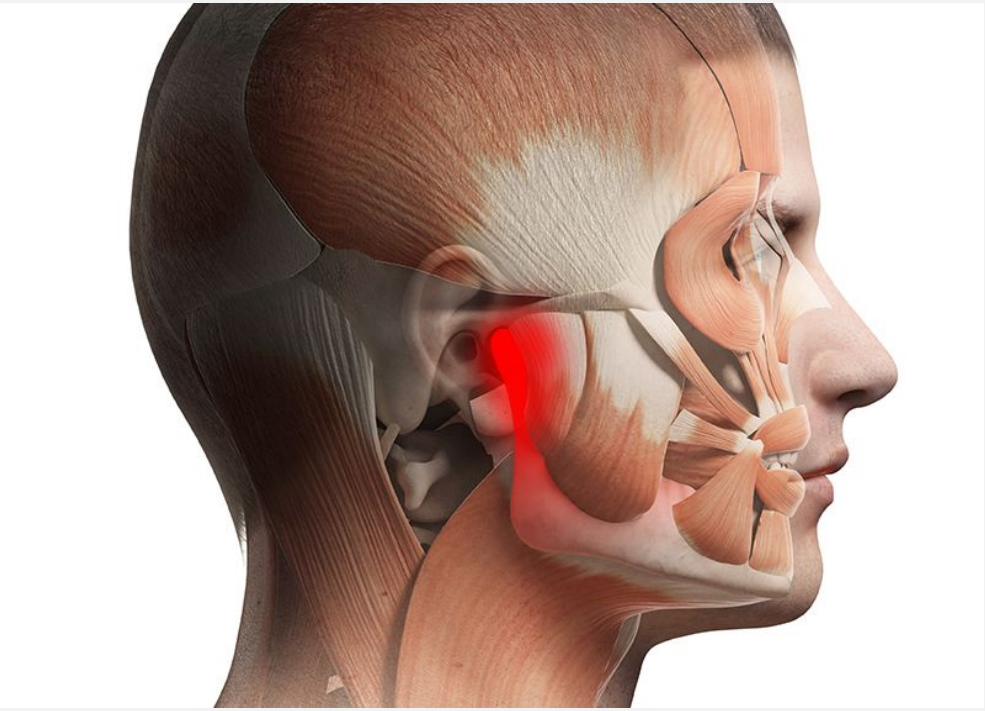
- **The articular disk is displaced anteriorly due to abnormal jaw mechanics; it may remain displaced (without reduction) or return (with reduction).**
  - Disk displacement with reduction typically manifests with clicking/popping and pain with jaw use (such as chewing).
  - Disk displacement without reduction does not manifest with clicking/popping, but maximum jaw opening is limited to ≤ 30 mm.

(Poluha, R., 2019)

WHAT IS BILATERAL MASTICATORY MYALGIA?

- **Masticatory myalgia:** is characterized as a dull persistent ache overlying the jaw

- Interplay between the muscles and joints
  - leads to stiffness, headaches, ear pain, malocclusion, clicking sounds/trismus, restricted opening, and fatigue



Litko, M. (2017).
Gray, R. J.,(1994).

SOURCES

- Gray, R. J., Quayle, A. A., Hall, C. A., & Schofield, M. A. (1994). Physiotherapy in the treatment of temporomandibular joint disorders: A comparative study of four treatment methods. *British Dental Journal, 176*(7), 257-261.
- Litko, M., Berger, M., Szkutnik, J., & Różyło-Kalinowska, I. (2017). Correlation between direction and severity of temporomandibular joint disc displacement and reduction ability during mouth opening. *Journal of Oral Rehabilitation, 44*(12), 957-963.
- Poluha, R. Canales, G., Costa, Y., Grossman, E., Bonjardim, L., Conti, P. (2019). Temporomandibular joint disc displacement with reduction: A review of mechanisms and clinical presentation. *Journal of Applied Oral Science, 27*.
- Young, A. (2015). Internal derangements of the temporomandibular joint: A review of the anatomy, diagnosis, and management. *The Journal of Indian Prosthodontic Society, 15*(1), 2.

D3 PICO

- **Clinical Question:** What treatment can be offered to patients with anterior disc displacement and bilateral masticatory myalgia?

PICO FORMAT

P: Patients experiencing painful clicking of the TMJ

I: Injections of TMJ with occlusal splint

C: Occlusal splint alone

O: Subjective decrease in pain

PICO FORMATTED QUESTION

In patients experiencing painful clicking of the TMJ, do those who receive injections of the TMJ in addition to an occlusal splint notice a greater reduction of pain compared to those who receive an occlusal splint alone?

CLINICAL BOTTOM LINE

- TMDs consist of multiple different subtypes and it is important to diagnose and treat the pain of the TMD. The traditional method of treatment consists of occlusal appliances; however, injections into the TMJ in addition to occlusal appliances may provide a more significant reduction in pain for the patient. It is important to determine the most effective treatment modality in order to best treat our patient with anterior disc displacement with masticatory myalgia.

SEARCH BACKGROUND

- **Date(s) of Search:** 11/10/20 & 11/11/20
- **Database(s) Used:** PubMed for National Institutes of Health
- **Search Strategy/Keywords:** Trigger Point Injections, Myofacial Pain, Temporomandibular Joint Disorders, Injections, Occlusal Splints

SEARCH BACKGROUND

- **MESH terms used:** Trigger Points; Myofacial Pain Syndromes; Temporomandibular Joint Disorders; Occlusal Splints

ARTICLE 1 CITATION, INTRODUCTION

- **Citation**: Al-Moraissi, Essam Ahmed et al. "The hierarchy of different treatments for arthrogenous temporomandibular disorders: A network meta-analysis of randomized clinical trials." *Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery*vol. 48,1 (2020): 9-23. doi:10.1016/j.jcms.2019.10.004

- **Study Design**: Meta-Analysis of Randomized Clinical Trials

- **Study Need/Purpose**: To identify and rank the effectiveness of treatment of arthrogenous TMDs with respect to pain reduction and improved mouth opening

ARTICLE 1 SYNOPSIS

- **Method:** Select RCTs comparing fourteen different treatment against control/placebo – found 36 RCTs for pain and 33 for MMO
  - Variables:
    - Control/Placebo
    - Conservative treatment (mm exercise, occlusal splint therapy)
    - Occlusal splint therapy alone
    - Intraarticular injection (of HA or CS)
    - Arthrocentesis (w/ or w/o HA, CS, PRP)
    - Arthroscopy (w/ or w/o HA and PRP)
    - Open joint therapy
    - Physiotherapy
  - Type of TMJ arthrogenous disorder: ID and TMJ osteoarthritis

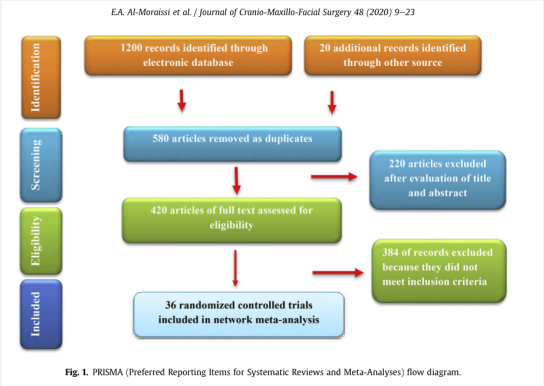
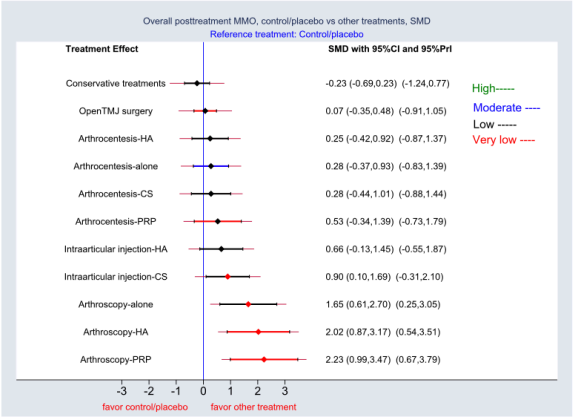
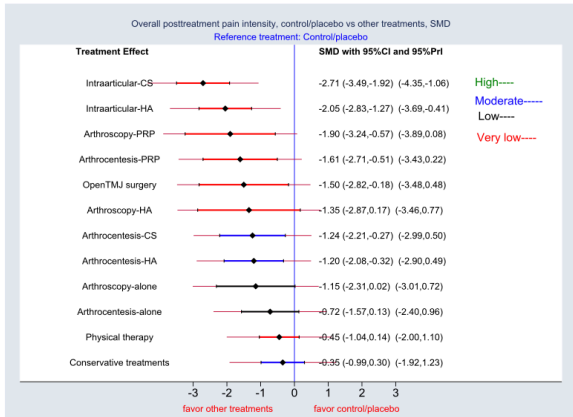


Fig. 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram.

ARTICLE 1 SYNOPSIS





- **Results** (pain reduction)
  - Most effective: IAI-CS followed by IAI-HA
    - Follow-up time range: 1 week – 4 years
  - Least effective: Placebo/Control
    - Second least effective: Conservative treatment
- **Conclusions**
  - Minimally invasive more effective than conservative treatment
  - ST pain reduction: IAI-HA most effective
  - IT pain reduction: No difference between minimally invasive
  - Minimally invasive procedures should be first-line or considered early
- **Limitations**
  - RCTs included different stages of arthrogenous TMDs
  - Heterogeneity in dosage, session #s, and concentration of medications
  - All RCTs used different recruitment criteria → selection bias may be present

ARTICLE 1 SELECTION

- **Reason for selection**
  - This article is a meta-analysis that compares different treatment options for TMD in terms of pain reduction
  - Our goal is to treat the pain of our patient's TMD
- **Applicability to your patient**
  - The treatment options for our patient is to utilize minimally invasive treatment alone or to utilize minimally invasive treatment along with injections
  - These different options are explored in this article
  - However, this article focuses on arthrogenous TMD (including ID)
    - Our patient was diagnosed with ID, but whether the underlying cause is arthrogenous or not is unknown
- **Implications**
  - This article allows us to consider the use of minimally invasive procedures, such as injections, in conjunction with their current conservative treatment (occlusal splint) especially if patient does not show clear benefit early on

ARTICLE 2 CITATION, INTRODUCTION

- **Citation**: Al-Moraissi, Essam Ahmed et al. "The hierarchy of different treatments for arthrogenous temporomandibular disorders: A network meta-analysis of randomized clinical trials." *Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery*vol. 48,1 (2020): 9-23. doi:10.1016/j.jcms.2019.10.004

- **Study Design**: Retrospective Study (Ind Case Control)

- **Study Need/Purpose**: Show the effectiveness of TPI to masticatory mm when occlusal splints are not effective

ARTICLE 2 SYNOPSIS

- **Method**
  - Retrospective study composed of TMD pts
  - Variables
    - SS therapy only
    - TPI +SS
    - TPI + SS + Arthrocentesis
    - SS + Arthrocentesis
  - Type of TMD: ID and Myofacial Pain Syndrome

ARTICLE 2 SYNOPSIS

- **Results**
  - Combined therapy always found to be more effective than single
  - Pain reduction: SS + TPI 3x alternating days > SS + TPI 3x per week > SS only
    - T0→T1 significant in TPI+SS; T0→T3 significant in all; TPI+SS greater decrease overall
- **Conclusions**
  - Recommend start tx with TPI +SS
    - 3x/day every 3 days
  - If pt doesn't recover, arthrocentesis should be considered
- **Limitations**
  - Results should be confirmed in RCT
  - Lacks a TPI only group
  - Another study should be conducted w/o use of vasoconstrictors

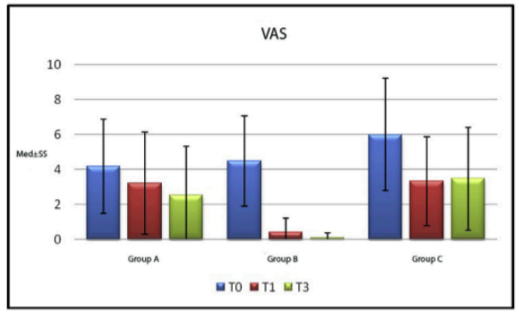


Fig. 6. Visual analog scale (VAS) evaluation.

ARTICLE 2 SELECTION

- **Reason for selection**
  - Our patient was dx with ID and myofacial pain
  - This article focuses specifically on these pts
  - This article covers TPI + SS vs SS, which are the therapy options we are considering for the patient
- **Applicability to your patient**
  - This article can be directly applied to the patient
- **Implications**
  - This article may help indicate the use of TPI along with the occlusal splint that the patient is currently using to treat their TMD, especially if the occlusal splint isn't as effective
  - This article is a level 4b evidence, so additional higher-level evidence may be indicated

ARTICLE 3 CITATION, INTRODUCTION

- **Citation**: Ozkan, Fatih et al. "Trigger point injection therapy in the management of myofascial temporomandibular pain." *Agri : Agri (Algoloji) Dernegi'nin Yayin organidir = The journal of the Turkish Society of Algology* vol. 23,3 (2011): 119-25. doi:10.5505/agri.2011.04796

- **Study Design**: Randomized Controlled Trial

- **Study Need/Purpose**: To compare the effectiveness of combined tx in management of myofascial TMD

ARTICLE 3 SYNOPSIS

- **Method**
  - 50 pts clinically and radiographically dx with myofascial TMD randomly assigned to two groups of 25
  - Group 1: SS only
  - Group II: TPI +SS therapy
- **Results**
  - Positive improvements in overall signs/symptoms
  - Statistically significant differences observed in both groups
  - Group 2 showed significant reduction in VAS
  - Significant difference between VAS of Group 1 and Group 2

Table 1. The comparison of different variables between the two groups

Signs and symptoms	Before		After		p
	Group 1 n=25 (%)	Group 2 n=25 (%)	Group 1 n=25 (%)	Group 2 n=25 (%)	
Frequency of myofascial pain					
Never	0	0	8 (32)	14 (56)	0.093
Rarely	0	0	11 (44)	10 (40)	
Once a month	0	0	4 (16)	1 (4)	
Once a week	1 (4)	0	2 (8)	0	
Twice a week	5 (20)	4 (16)	0	0	
Daily or constantly	19 (76)	21 (84)	0	0	
Pain at rest	17 (68)	18 (72)	5 (20)	1 (4)	0.087
Pain during mandibular movements	23 (92)	24 (96)	12 (48)	2 (8)	**0.005**
Masticatory muscles					
0	0	0	3 (12)	9 (36)	**0.001**
1-3 trigger point	5 (20)	4 (16)	9 (36)	14 (56)	
≥4 trigger point	20 (80)	21 (84)	13 (52)	2 (8)	
Intensity of myofascial pain					
No pain	0	0	3 (12)	12 (48)	**0.004**
Slight	1 (4)	0	17 (68)	13 (52)	
Moderate to severe	16 (16)	14 (56)	4 (16)	0	
Severe or very severe	8 (32)	11 (44)	1 (4)	0	
Improvement of subjective symptoms					
Beter	0	0	20 (87)	13 (54.2)	**0.033**
Much better	0	0	3 (13)	11 (45.8)	
Reciprocal clicking	13 (52)	14 (56)	12 (10)	11 (10)	1.00

ARTICLE 3 SYNOPSIS

- **Conclusions**
  - TPI combined with SS is effective in management of myofascial TMD pain
  - Further research (RCT or higher) should be carried out to determine effectiveness over other tx modalities
- **Limitations**
  - Absence of control group without therapy
    - Cannot determine influence of other factors
  - Difficult to compare results with literature
    - Lack of studies comparing TPI and occlusal appliances

Table 2. VAS scores of Group 1 and Group 2

		Group 1 (n=25) Mean±SD	Group 2 (n=25) Mean±SD	T	P
Pain intensity VAS (mm)	Before	7.20±1.50	7.48±1.71	0.62	0.541
	2 week follow-up	5.83±1.27	4.92±1.44	2.35	**0.023**
	4 week follow-up	4.64±1.25	3.00±1.12	4.88	**<0.001**
	12week follow-up	3.16±1.52	1.40±1.16	4.61	**<0.001**
		F=96.71, **p<0.001***	F=172.31, **p<0.001***		
		F=9.74, **p=0.003**			

ARTICLE 3 SELECTION

- Reason for selection
  - This is a RCT comparing TPI + SS therapy to SS alone
  - The pt population of this study aligns with that of our pt
- Applicability to your patient
  - This study can be directly applied to the pt
- Implications
  - Utilizing TPI along with the current occlusal splint may be a more effective option in treating our pt than the current method of using an occlusal splint alone
  - Further studies may be indicated due to the limitations in this study

LEVELS OF EVIDENCE

- [x] **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- [x] **1b** – Individual RCT
- [ ] **2a** – Systematic Review of Cohort Studies
- [ ] **2b** – Individual Cohort Study
- [ ] **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research
- [ ] **4a** – Systematic Review of Case Control Studies
- [x] **4b** – Individual Case Control Study
- [ ] **5** – Case Series, Case Reports
- [ ] **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- [ ] **7** – Animal Research
- [ ] **8** – In Vitro Research

STRENGTH OF RECOMMENDATION TAXONOMY (SORT)

☐	**A** – Consistent, good quality patient oriented evidence
☒	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

CONCLUSIONS: D3

How does the evidence apply to this patient?

- **Literature**
  - The majority of the evidence directly applies to the patient and compares the treatment modalities in question. However, there is a lack in both quantity and quality of evidence
- **Specialist experience**
  - When looking at TMD, it is important to make an accurate dx and to treat pain instead of noise. The evidence utilizes decrease in pain as an outcome for comparison

Based on the above considerations, how will you advise your D4?

- I would advise my D4 to start with a stabilization appliance and to re-evaluate the decrease in signs and symptoms. If there is not a significant decrease or disappearance of pain early on (within 1 month), I would advise my D4 to consider utilizing TPI in conjunction with the current occlusal appliance

CONCLUSIONS: D4

- I would advise the patient to see the effects of the combination of the muscle relaxant prescribed and the stabilization splint that was delivered.

- If there is no decrease in pain and symptoms, that I would recommend receiving TPI by a specialist

DISCUSSION QUESTIONS

- What are the most common causes of temporomandibular joint disorders?
- Is TPI done with other joints in the body as well?
- How long do the symptom relief benefits of TPI last for the patient? How often do you recommend TPI treatments?
- At what point does treatment need to transition from therapeutic to surgical?
- Are there any negative side effects of TPI and when is it contraindicated?
- Are TPI injections the standard of care for all TMJ disc displacements? For example would a posterior disc displacement require a different treatment strategy?

DISCUSSION QUESTIONS

- How practical is treatment with TPI for a patient in regards to cost, time between in injections, etc?
- Are there any surgical procedures to correct severe TMD?
- What types of TMJ treatment can be provided by a general dentist and what treatments should be administered by a specialist?
- Which procedure would be better if the patient comes in earlier in the development of the jaw clicking compared to them coming in after years of dealing with it?

THANK YOU!