Fall Rounds

Treatment of Disc Displacement with Reduction

—

Evidence Based Dentistry Rounds
TMD
Group B
Team 4A-4
10/28/2020

Rounds Team

- **Group Leader: Dr. Grady**
- **Specialty Leader: Dr. Waliszewski**
- **Project Team Leader: Abby Schabel**
- **Project Team Participants: Megan Maynard; Joud Alabyad; Jacob Cassaro**

Patient: SM

- Age: 27
- Gender: Male
- Ethnicity: White/Asian
- Chief Complaint: “Sometimes my jaw clicks which doesn’t bother me that much but my right masseter is tender. I’m interested in a night guard”.

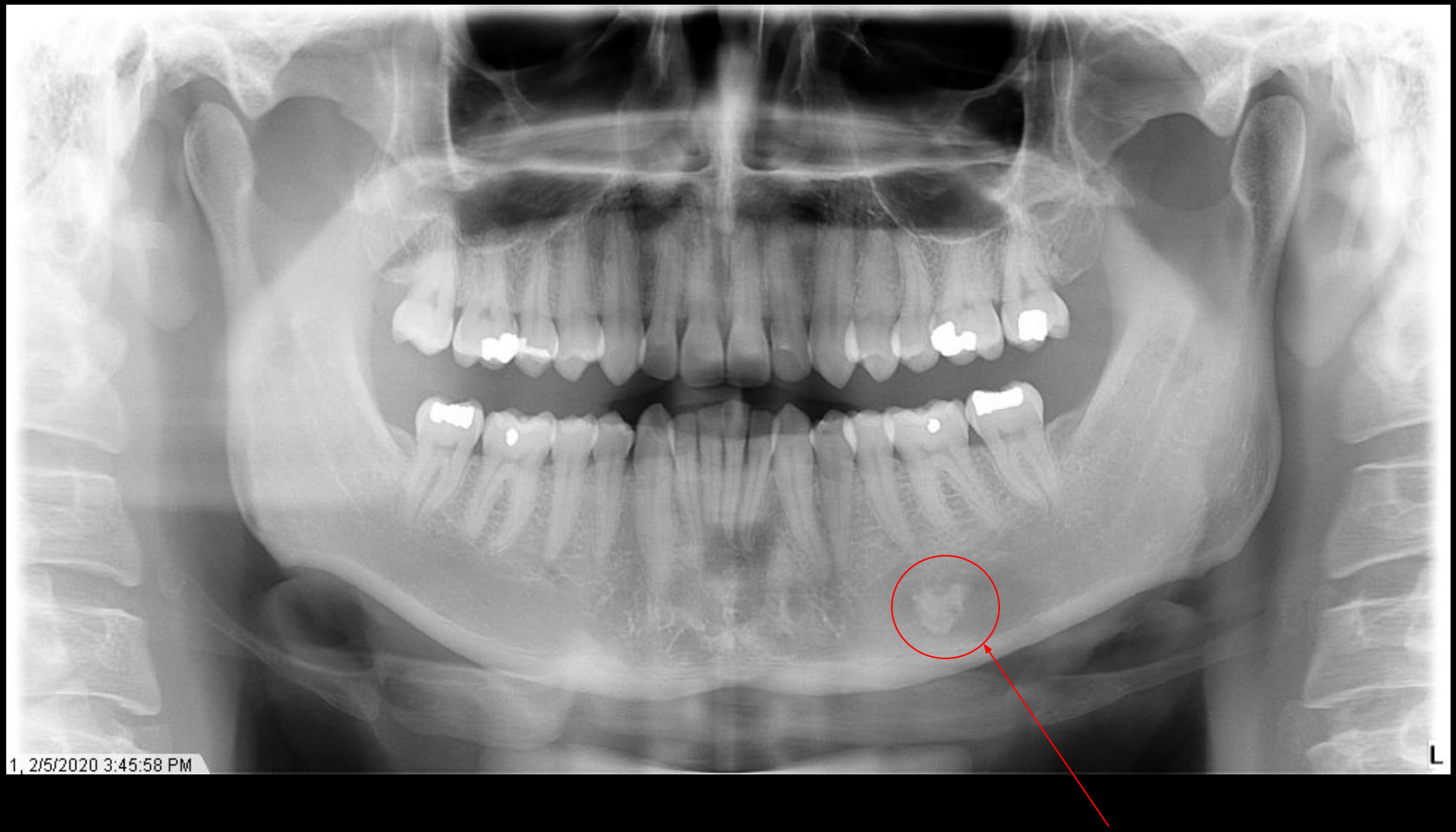
Medical History

- Conditions
  - Seasonal allergies
- Medications
  - Zyrtec

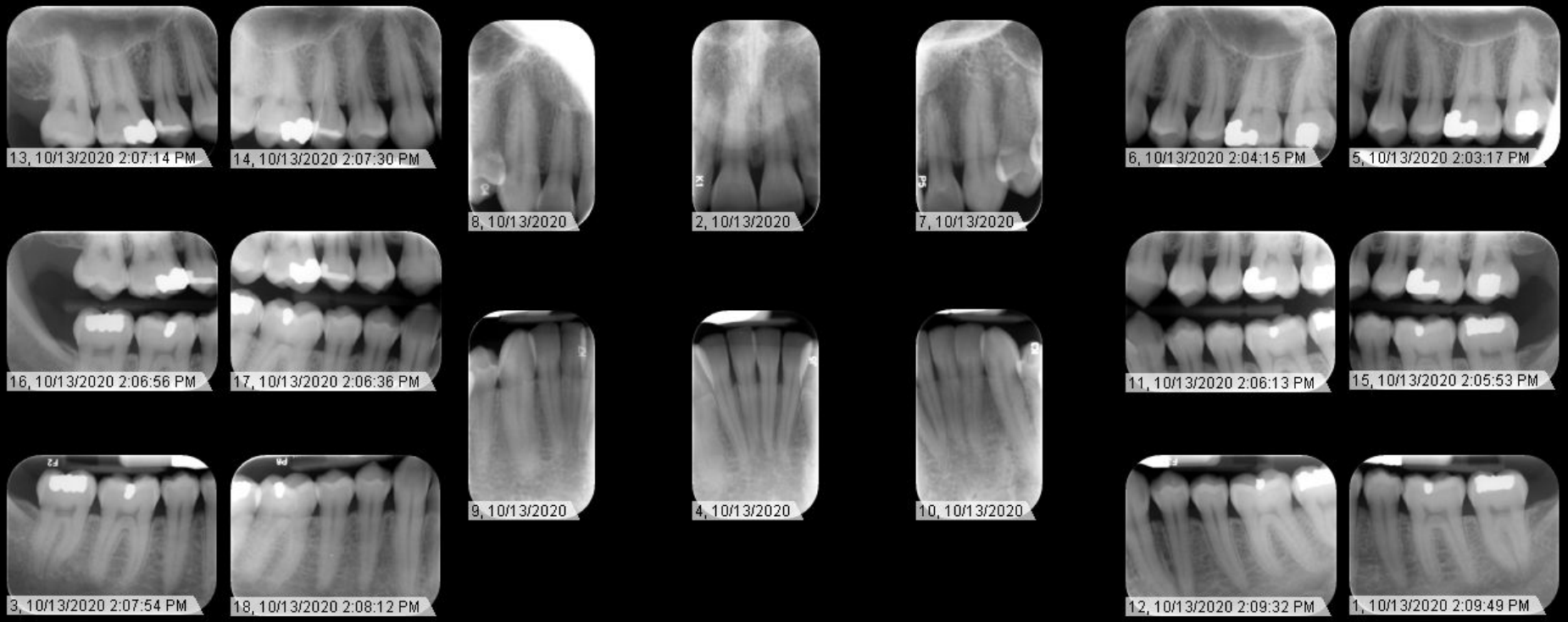
Dental History

- Restorations
  - Amalgam: #3MO, #14MO, #15O, #18O, #19B, #30B, #31O
  - Resin: #4DO
- Underwent orthodontic treatment on maxilla
- Hx of TMD
  - Pt. received occlusal guard in past but reports it doesn't fit well

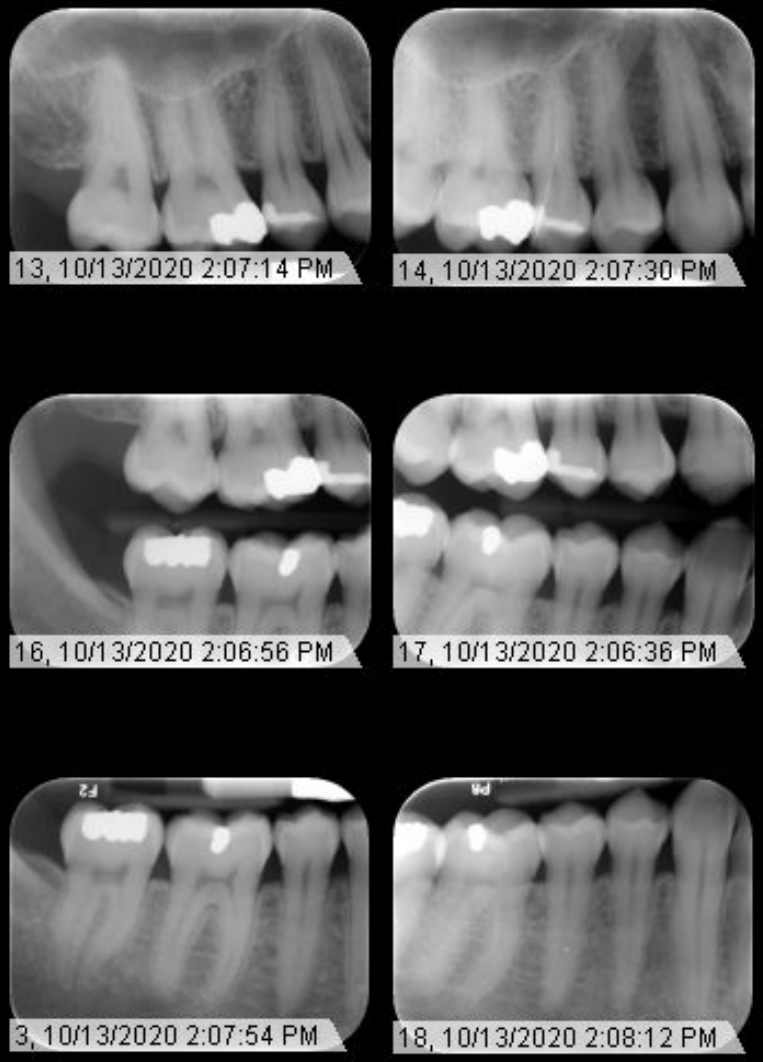
Radiographs - Pan



Radiographs - FMX

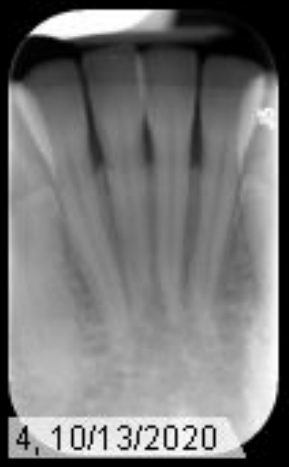


Radiographs - Right Posterior



Radiographs - Left Posterior

Radiographs - Anterior



Radiographic Findings

- Idiopathic osteosclerosis

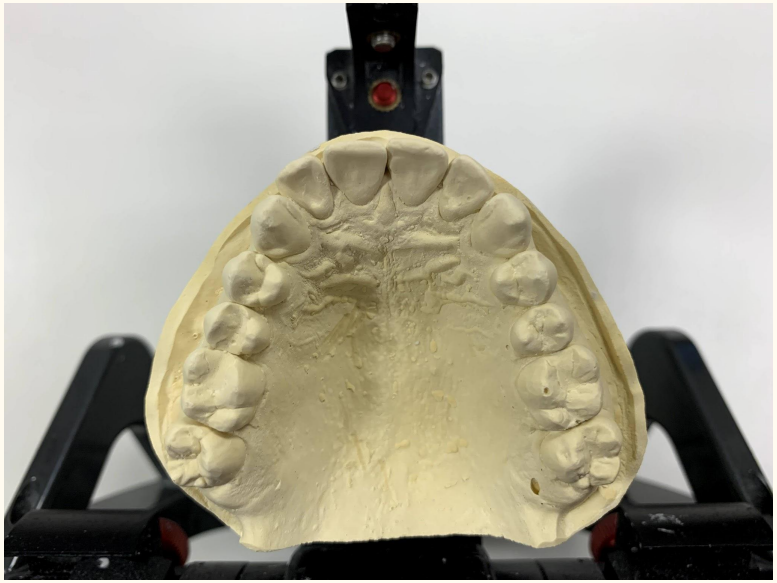
Clinical Findings

- Restorations
  - Amalgam: #3MO, #14MO, #15O, #18O, #19B, #30B, #31O
  - Resin: #4DO
- Clicking of TMJ on right side
- Class I occlusion
- Bilateral canine guidance

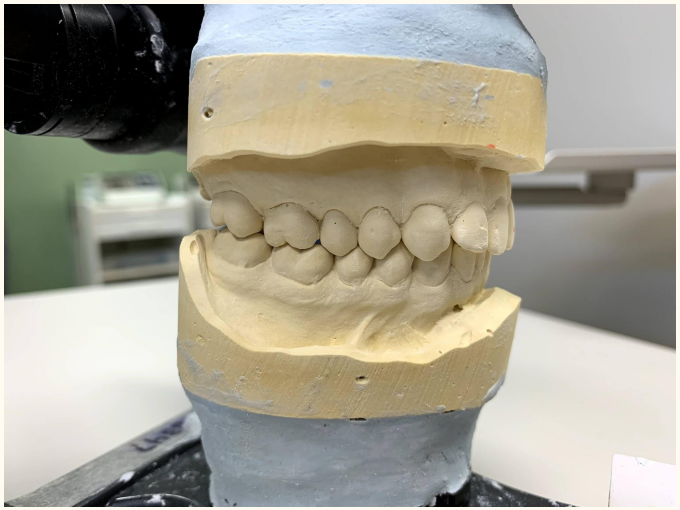
Clinical Findings

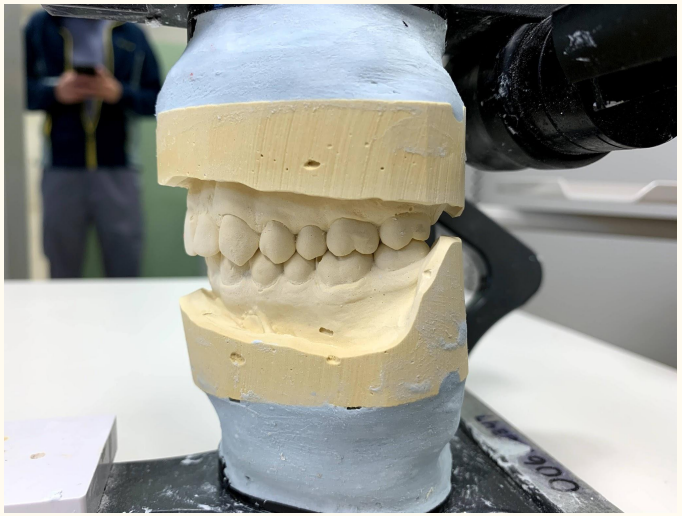
Clinical Findings

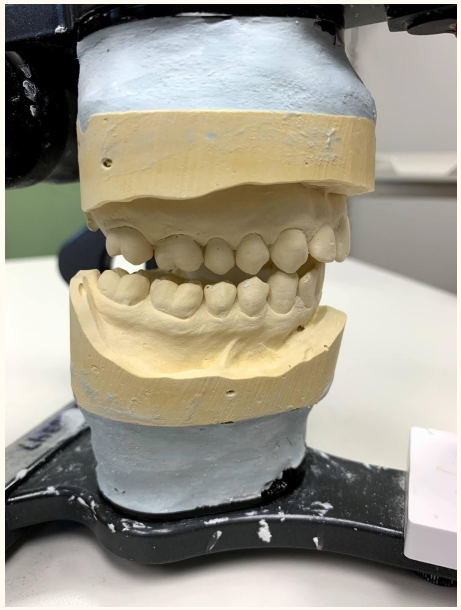
Clinical Findings



Clinical Findings







Specific Findings

- Clicking of TMJ on right side upon opening and closing

Periodontal Charting

																MOBILITY
																FURCA
																PLAQUE
							B									BOP
	6 6 6	6 6 6	6 6 6	6 6 6	7 7 7	7 7 7	7 7 7	7 7 7	7 7 7	7 7 7	5 5 5	5 5 5	5 5 5	5 5 5		MGJ
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	2 2 2	2 1 2	2 2 2	2 1 2	2 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	2 1 1	2 2 3	1 1 2		CAL
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	2 2 2	2 2 2	2 1 1	2 1 2	2 1 1	2 1 2	2 1 2	2 2 1	1 1 2	2 2 2	2 1 2	2 1 2	2 1 2	2 1 1		CAL
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																BOP
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																MOBILITY

Diagnosis

- Disc displacement with reduction

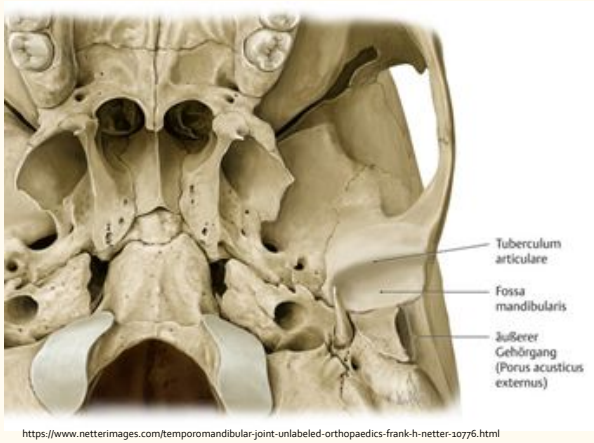
Problem List

- Crowding
- Hx of TMD

D1 Basic Science: What is the anatomy of the Temporomandibular Joint (TMJ)?

- The TMJ consists of the articulation point between the head of the mandibular condyle and the mandibular fossa of the temporal bone.
- The TMJ is considered a synovial joint. More specifically, it is classified as a ginglymoarthrodial joint due to the combination of both gliding and hinge movements.
- Within the mandibular fossa there are two slopes of the articular eminence: anterior slope (non-load bearing) and posterior slope (pressure bearing).
- The articular tubercle is the boney projection found on the lateral aspect of the articular eminence.
- The TMJ is innervated by the mandibular branch of the trigeminal nerve.


http://www.sdmesa.edu/academics/schools-departments/biology/bio160/bones-axial-skeleton.shtml

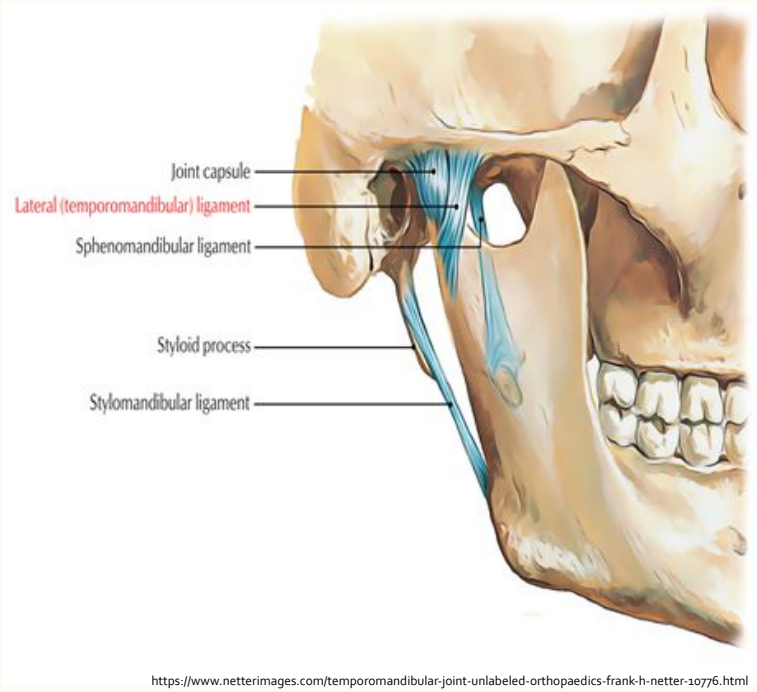


https://www.netterimages.com/temporomandibular-joint-unlabeled-orthopaedics-frank-h-netter-10776.html

Joint Capsule and Ligaments of the TMJ

There is a joint capsule and three major ligaments associated with the TMJ.

- The joint capsule is composed of dense fibrous connective tissue that surrounds the TMJ.
  - There is a synovial membrane that produces synovial fluid which lines the joint capsule.
- Temporomandibular Ligament:
  - Originates from the zygomatic process of the temporal bone and inserts into the neck of the mandibular condyle.
  - The ligament serves to prevent posterior and excess lateral displacement of the TMJ.
- Sphenomandibular Ligament:
  - Originates from the spine of the sphenoid and inserts into the lingula of the mandible.
  - This ligament will become taught during excessive opening of the mouth.
- Stylomandibular Ligament:
  - Originates from the styloid process of the temporal bone and inserts into the angle of the mandible.
  - It will become taught during excessive protrusion of the jaw.



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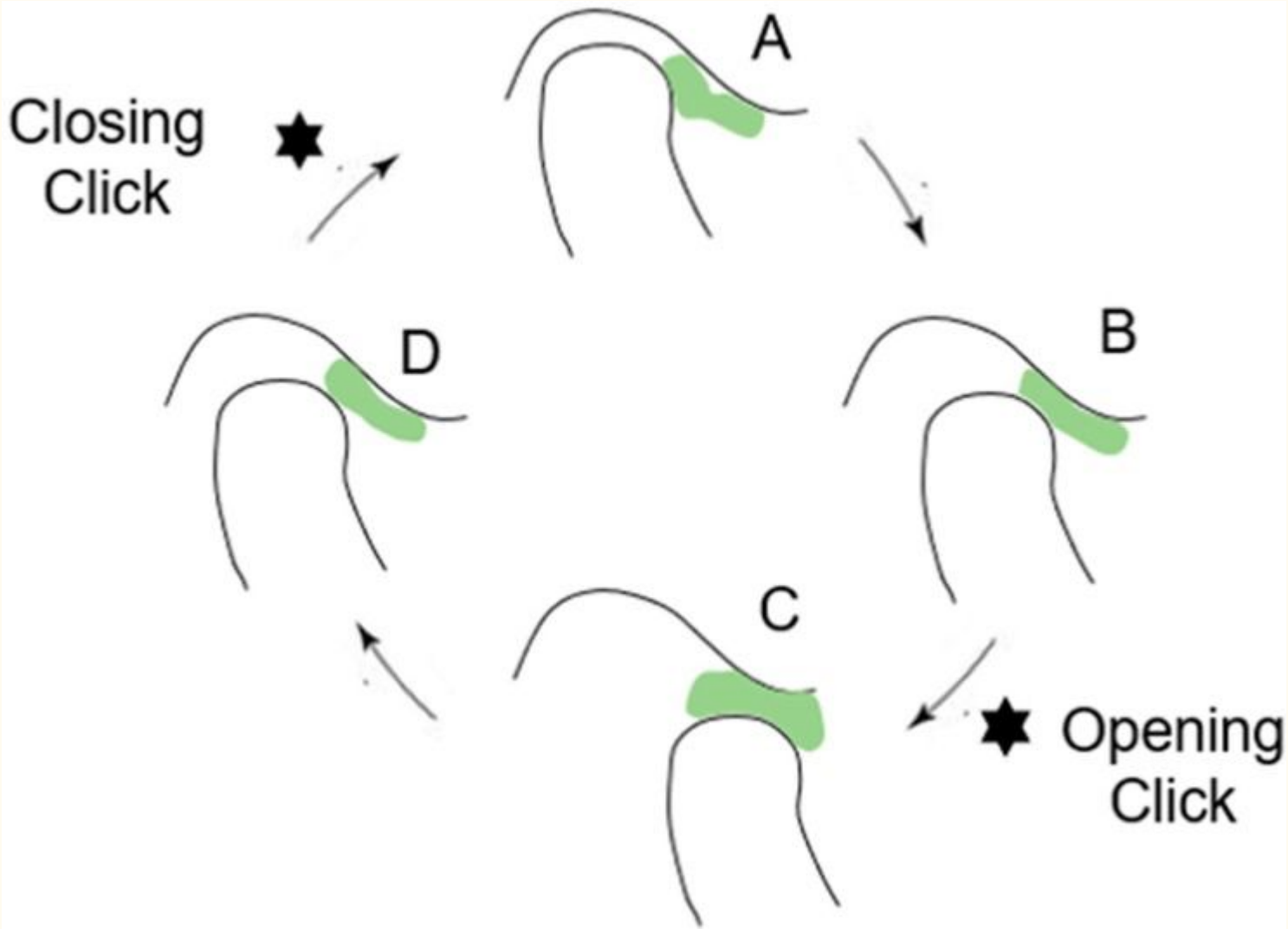
D2 Pathology: What causes disc displacement with reduction?

- DDWR is a TMD
- According to the American Academy of orofacial pain, a TMD is a a group of disorder involving the masticatory muscles, TMJ, and associated structures.
- Corresponds to 41% of clinical diagnoses and can occur in 33% of asymptomatic individuals[1]
- What is it? When the mouth is closed, the articular disc is displaced in relation to the condyle. Upon opening, it returns to its normal position between condyle and articular tubercle.

- Range of motion not affected. Mandibular movements not as smooth, associated with clicking, snapping, and/or popping.

Picture 1[1]



Etiology of DDWR

- A highly prevalent clinical condition which is still causes many doubts regarding the true risk of the disorder, prognosis, and need for treatment.
- Complicated etiology.
- Displacement due to elongation of lateral collateral ligaments and/or retrodiscal tissues. Thinning on posterior border also makes it more likely[1].
- Factors leading to DDWR are partially attributed to microtrauma and macrotrauma[3]. Those include bruxism, stress, clenching, and trauma amongst others[2].
- Condition is stable. Treatment should be done when the patient's chief complaint is DDWR or if the condition is presenting with pain.

Citations

(1) Poluha, R. L.; Canales, G. D. la T.; Costa, Y. M.; Grossmann, E.; Bonjardim, L. R.; Conti, P. C. Temporomandibular Joint Disc Displacement with Reduction: A Review of Mechanisms and Clinical Presentation. *J. Appl. Oral Sci.* **2019**, *27* (0), e20180433.

(2) Gonzaga AR, L.-S. M.; Ribeiro EC, G. A. S. Disc Displacement with Reduction of the Temporomandibular Joint: The Real Need for Treatment. *J. Pain Relief* **2015**, *04* (05), 1–5.

(3) Marley-. TMJ internal derangements https://www.oralhealthgroup.com/features/tmj-internal-derangements/ (accessed Oct 23, 2020).

D3 PICO

- **Clinical Question: What type of occlusal guard is most effective for patients with anterior disc displacement with reduction?**

PICO Format

P: Patient with anterior disc displacement

I: Anterior repositioning appliance

C: Stabilization appliance

O: Reduction in patient's experienced pain.

PICO Formatted Question

In patients with disc displacement with reduction, do anterior repositioning appliances result in greater reduction in pain symptoms than stabilization appliances?

Clinical Bottom Line

Anterior repositioning appliances show great promise in treating patients with anterior disc displacement with reduction. Compared to stabilized splints, anterior repositioning splints were more likely to relieve joint pain and clicking as well as eliminate muscle tenderness than their stabilizing splint counterparts. Anterior repositioning appliances however have their drawbacks. In patients with class I occlusions, anterior repositioning appliances may cause posterior open bites and often times require the additional use of a stabilizing appliance to help 'settle the oclusion'. Therefore, our patient should be started on a stabilizing splint, given that they too have been shown to provide great improvement in pain management.

Search Background

- **Date(s) of Search:** October 18, 2020; October 19, 2020
- **Database(s) Used:** Cochrane Library, Wiley Online Library, PubMed for National Institutes of Health
- **Search Strategy/Keywords:** TMJ disc displacement, Occlusal guard intervention, anterior repositioning splint, anterior disc displacement, twin block, occlusal splints

Search Background

- **MESH terms used:** Dental Occlusion, Temporomandibular Joint Disc, Temporomandibular Joint Disorders, Occlusal Splints, Joint Dislocations

Article 1 Citation, Introduction

- Citation: Liu, Mu-Qing, Lei, Jie, Han, Jian-Hui, Yap, Adrian U-Jin, & Fu, Kai-Yuan. (2017). "Metrical analysis of disc-condyle relation with different splint treatment positions in patients with TMJ disc displacement." Journal of Applied Oral Science, 25(5), 483-489. https://0-doi-org.libus.csd.mu.edu/10.1590/1678-7757-2016-0471

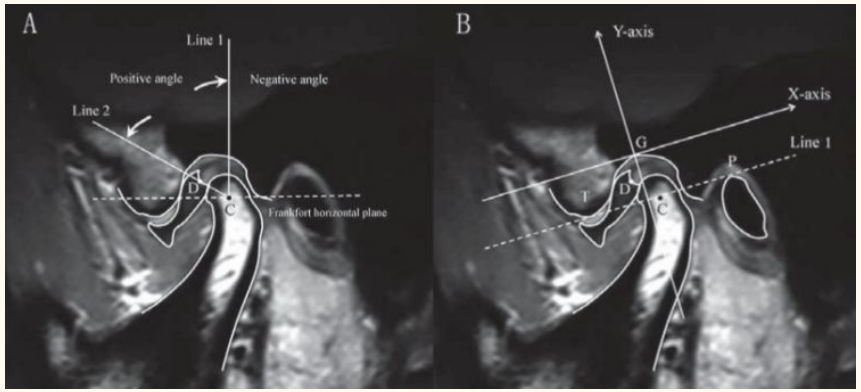
- Study Design: Cross Sectional/Individual Cohort Study

- Study Need / Purpose: This study examines how the spatial relationship of the disc and condyle are altered when the jaw is stabilized in three different positions, in patients with disc displacement with reduction.

Article 1 Synopsis

- Method: this study recruited 37 patients to examine disc-to-condyle positioning via MRI while their occlusion is stabilized in three different positions.
    1. Maximum intercuspation
    2. Edge-to-edge
    3. Stabilized in the most retruded position

Article 1 Synopsis



- Results :
  - Normal disc-condyle angle: $-15^\circ \sim +15^\circ$
  - Position 1: disc moved anteriorly and inferiorly, condyle moved posteriorly and superiorly
  - Position 2 and 3: disc moved posteriorly and superiorly, but did so more with position 2

Position	Normal Joints (N = 10)	Joints with DDwR (N = 60)
Position 1	–1.1±10.8	53.4±16.7
Position 2	–11.7±12.0	–10.5±17.1
Position 3	–2.7±15.5	30.1±26.9

- Conclusions: Both anterior positioning and stabilized positioning may prove to be beneficial in establishing a more normal disc to condyle relationship. Anterior repositioning appears to improve the relationship more so than stabilized positioning.
- Limitations: This study does not follow patients over the course of a particular treatment, therefore it cannot speak to the long term effectiveness of either treatment.

Article 1 Selection

- Reason for selection: This article simply shows the immediate results of stabilizing patients' occlusion in different positions. These positions represent the positions that would be achieved through ARS or SS.

- Applicability to your patient: The treatment options for our patient are either to use a ARS, an SS or do nothing, each of which this study explores.

- Implications: This study serves as a starting point for understanding how occlusal positioning affects disc and condyle positioning.

Article 2 Citation, Introduction

- Citation: Chen, H.-M., et al. “Physiological Effects of Anterior Repositioning splint on Temporomandibular Joint Disc Displacement: a Quantitative Analysis.” Journal of Oral Rehabilitation, vol. 44, no. 9, 2017, pp. 664-672., doi:10.1111/jor.12532

- Study Design: Individual Cohort Study

- Study Need / Purpose: This article examines the effects of anterior repositioning appliances over a course of time. It is important that we know how the short and long term use of anterior repositioning appliances causes change in patients with disc displacement with reduction.

Article 2 Synopsis

- Method: 22 patients between the ages 15 and 27 were recruited to be a part of this study. Of these patients, 13 were female and 9 were male. Each patient received an ARS that held their occlusion in an edge-to-edge position. Subject wore their appliance for 3 months continuously, removing only to brush their teeth. Monthly visits were done to ensure compliance and monitor progress. After 3 months, splints were only worn at night. Patients were again recalled after 6 months to assess for signs and symptoms. MRI was done on patients in two appointments, before treatment (max intercuspation, open, with splint) and 6 months afterwards (closed and opened without ARS).

Article 2 Synopsis

- Results: 32 joints were diagnosed with DDwR based on MRI imaging. Mean disc-condyle angle was 52.10 +/- 4.8 (normal: 2.9 +/-4.07). Upon insertion, the mean disc-condyle relationship became -17.93 +/- 3.45 and had no significant difference to the normal joint (-21.92 +/-5.83). After 6 months, no patient was experiencing pain, joint clicking returned in 7 out of 26 joints. According to MRI, only 40.6% of joints were maintained in the normal disc-condyle relationship, the other 59.4% of reduced discs returned to their displaced position.
- Conclusions: Upon ARS insertion, all patients exhibited a more ideal disc-to-condyle relationship. The majority of patients did not maintain this relationship upon ARS removal, 6 months after treatment.
- Limitations: This study does not compare the use of ARS to SS, does not follow up with patients after 6 months and also has a fairly small sample size.

Article 2 Selection

- Reason for selection: This article seeks to find the short term benefits to using an ARS appliance.
- Applicability to your patient: ARS appliances are one of the two appliances we are considering to treat our patient.
- Implications: ARS may prove to be beneficial to our patient but the long term effectiveness appears to be variable. In a majority of patients, the disc-to-condyle relationship returned to their pre-treatment position, implying the need for continuous treatment to maintain results.

Article 3 Citation, Introduction

- Citation: Rohida NS, Bhad W. “A clinical, MRI, and EMG analysis comparing the efficacy of twin blocks and flat occlusal splints in the management of disc displacements with reduction.” World J Orthod. 2010 Fall;11(3):236-44. PMID: 20877732.

- Study Design: Individual RCT

- Study Need / Purpose: This article directly compares and contrast the effects of stabilizing appliances to anterior repositioning devices over the course of a year. this article is important to this research because it directly compares the two treatment options to each other

Article 3 Synopsis

- Method: This study recruited 20 subjects (13 female and 7 male) between 12 and 20 years of age. The sample was randomly split into two groups of ten. Group one was to receive the twin block (ARS) appliance Group two was to receive the SS appliance. MRI was used to asses the disc-to-condyle relationship and EMG was used to assess the postural activity of the masseter and temporalis. Patients were instructed to wear their appliance 24 hours a day, including during meals. Patients were recalled at one week, and then every 4 weeks for 6 months. After 6 months appliance use was gradually reduced/discontinued. Patients were again assessed at 12 months.

Article 3 Synopsis

- Results: 12 Month Follow Up
  - Twin Block: pain relief and reduced muscle tenderness in all patients, elimination of clicking in 8 of 10 patients. 8 of the 10 patients showed normal disc-to-condyle relationships
    - Pretreatment disc-to-condyle relationship: 37.4 +/- 4.6 degrees
    - Posttreatment disc-to-condyle relationship: 4.1 +/-14.8 degrees
  - Stabilizing Splint: pain relief in 7 of 10 patients, reduced muscle tenderness in 2 of 3 patients, elimination of clicking 3 of 10 patients. Only 3 of the 10 patients maintained a normal disc-to-condyle relationship.
    - Pretreatment disc-to-condyle relationship: 33.8 +/- 3.7 degrees
    - Posttreatment disc-to-condyle relationship: 25.9 +/- 9.0 degrees
- Conclusions: Twin block appliances are effective in reducing pain, clicking and muscle tenderness. Stabilization splints are effective in reducing pain and muscle tenderness but not as successful in eliminating clicking. Twin block appliances are also noted to be contraindicated in patients with Class I occlusion due to posterior open bite.
- Limitations: Study has a rather small sample size.

Article 3 Selection

- Reason for selection: This study directly compares the effectiveness of stabilizing splints to repositioning splint, the two treatments of interest, in patients DDwR.
- Applicability to your patient: This study directly applies to our patient, besides for the age group of the sample size.
- Implications: Our patient may stand to benefit from either stabilizing splints or anterior repositioning splints. Severity of our patients TMD should be assessed to determine which appliance would best suit him.

Levels of Evidence

☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)

☒ **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

☐ **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

Double Click table to activate check-boxes

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

- Double click table to activate check-boxes

Conclusions: D3

How does the evidence apply to this patient?

- The evidence presented in these articles, for the most part, apply directly to our patient. The treatments explored directly relate to the pathology that is being experienced. The age group of our patient is older than the average age of study participants but the result I believe are still viable.

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

- Based on the evidence seen, It would be best to start our patient on a stabilizing appliance. Given the tendency for anterior repositioning appliances to cause posterior open bite, and; given the severity of our patients TMD and his class I occlusion, it would be best to try to avoid its use. Should our patient's pain persist after using a stabilizing appliance, an anterior repositioning appliance may be a better alternative.

Conclusions: D4

- I will advise my patient to get a stabilization appliance
  - I will inform him that the appliance will treat the pain but NOT the noise
- I will help my patient by making adjustments to the appliance as part of an ongoing process to treat his condition

Discussion Questions

- Would the preferred treatment change if there was anterior disc displacement with reduction vs. without reduction?
- What are the effects of disc displacement with reduction on mandibular motion and function?
- Is there a reason the range of movement in individuals who suffer from DDWR is not affected?
- Are there any mediotrusive interferences that may be contributing to the patient's TMD?
- Would treatment change if the patient was experiencing posterior displacement with reduction?
- What are the differences between disc displacement with reduction and disc displacement without reduction and which has better prognosis?
- Can wearing a night guard for a long term period affect the normal occlusion of the patient?

Discussion Questions

- In the long run, how would an anterior repositioning appliance affect the occlusion of the patient?
- Would treatment for this patient change if they experienced pain along with clicking of the TMJ upon opening and closing?
- What are some indications for the use of an occlusal guard?
- How would one know if a patient has disc displacement at the TMJ?
- How long should the patient wear the occlusal guard to treat anterior disc displacement with reduction? Is this condition reversible?
- How frequent should occlusal guards be adjusted?
- What adjuncts can be added to the treatment to increase the success rate of TMD therapy?
- Does a patient's behavior enhance or cause anterior disc displacement e.g. chewing gum?

THANK YOU