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Case study: The role of Physical Therapy in the treatment of Temporomandibular Joint Disorder (TMJD)

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Abstract:
Background: *Temporomandibular joint disorder affects 40%-60% of the population and is prevalent at the age of 35-45year-old females. It involves several anatomical structures including bilateral (TMJ) and numerous muscles affecting the TMJ. Assessment and treatment of TMJD generally requires a specialized dentist and therapist due to the complexity of involved structures. The aim of this case study was to educate physical therapist in TMJD and provide intervention modalities.*
Case description: *A 34 –year-old female referred to physical therapy by her family medicine physician, presented with a history of six months' bilateral jaw pain, and left jaw clicking with yawning and eating any type of hard food such as apple, the patient could not fully open her mouth when she tried to fully open her mouth the lower jaw deviated to the left. She had tenderness of the cheek and neck muscles and poor posture (protruded head).*
Management and outcomes: *The patient received two times per week physical therapy sessions (total of 12 sessions) included: Postural re-education, strengthening exercises for neck and upper back, re-education of the jaw muscles to eliminate left deviation by the strengthening and stretching exercises for jaw, low intensity pulsed ultrasound (LPUS) to bilateral TMJ for inflammation and pain reduction, taping to the left jaw and home exercise program.*
Results: *At the end of the third week the patient was able to open her mouth within functional limits without deviation, but with minor pain at the left side of the jaw end range opening. By the end of the sixth week the patient had full, pain-free jaw opening, able to cut the hard food to small pieces and eat it without any clicking at the jaw and posture improved.*
Conclusion: the PT treatments that were administered to the patient seemed appropriate and successful for the patient.
Discussion: *The physical therapist should take a holistic approach and consider not only treatment for the TMJD, but also assess posture's of the patient and other potential impacts causing the patient's symptoms. The patient in this case study had great outcomes, but we should take in our considerations that the duration of treatment can vary for each patient depending upon the severity of the condition, diagnosis, and compliance with their home exercise program.*

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I. Introduction:

The temporomandibular joint (TMJ) is a fibro-cartilaginous hinged type joint that connects lower jaw to the skull[1] . The main actions of the TMJ are gliding, sliding and translation, which all occur during everyday actions such as eating, talking, and yawning. There are several muscles surrounded the TMJ, including the sternocleidomastoid, omohyoid and suprahyoid, attached to bones in the cervical spine, shoulder, and jaw, and have interrelated effects on all three areas.

TMJ inflammation and myofascial pain are sub-diagnoses of TMJD[2.] Myofascial pain occurs when a muscle is contracted repetitively which can be caused by repetitive motions or stress related muscle tension[3.] All the researchers indicated that dentists should involve physical therapists as soon as possible in the care of patients with TMJD. TMJD treatment requires specialized physical therapists; however, this specialization is not widely available at the Kingdom of Saudi Arabia. The authors concluded that due to the multifactorial issues with TMJD, patients need more treatment options than appliances, which trained physical therapists can offer. This case study will answer why the specialized therapist had a holistic approach in the successful treatment of TMJD.

II. Case Description:

Patient History: 34 years-old female, arrived to the physical therapy clinic with bilateral TMJ pain and rated her pain 4 at rest on the VAS (with 0 being no pain and 10 being the maximum) and a 7 out of 10 at its highest point with chewing, the pain radiated to the ear. She described her pain as dull and aching pain. She reported

that the food type, bite size and opening her mouth all affected her pain levels such as eating apple, cucumber or big bites of burger sandwich. Also she needed to be careful of how far to open her mouth when she had yawn as to much opening caused her jaw to click and sometimes lock. She is active and able to complete all of her daily activities without any obstacles. Medications that the patient was taking were birth control pills. The patient demonstrated rounded shoulders and forward head posture during sitting.

Assessment:

1. Observation /Examination:

Symmetrical facial structure, protruded head.

Muscle palpation: Temporalis include: posterior, middle and inferior aspects. Masseter includes: origin, body and insertion. She had shortened pectoralis minor musculature, as a result of protruded head. She demonstrated tenderness bilaterally to the masseter with greater discomfort on left compared to right, (see Table 1).

Table 1: Fascial muscle palpation

Muscle site	Pain: Yes (VAS 0-10) or No
Right Temporalis	No
Left Temporalis	No
Right Masseter	Yes 2 Tenderness
Left Masseter	Yes 3 Tenderness

TMJ joint palpation: lateral and intra-articular

The patient demonstrated tenderness bilaterally to the lateral palpation of the jaw that indicates inflammation at the capsule. She felt tenderness to palpation to the intra-articular of the TMJ left side which indicated disc displacement (see Table 2)

Table 2: Lateral and Intra-articular palpation

Joint site	Pain: Yes or No
Right Lateral Pole	Yes
Left Lateral Pole	Yes
Right Intra-articular	No
Left Intra-articular	Yes

Gross ROM for cervical flexion and extension, right and left rotation and side bending were all within normal limit (WNL). Jaw lateral deviation and protrusion WNL. Mandibular opening with midrange lateral deviation to left and pain at 40mm and without pain at 35mm (see Table 3)

Table 3: Range of TMJ Motion Measurements

Range of Motion	Left / Right
Cervical Extension	WNL
Cervical Flexion	WNL
Cervical Rotation to R&L	WNL
Cervical side bending to R&L	WNL
Mandibular max. opening with midrange lateral deviation to the left and pain	40mm
Mandibular max. opening with midrange lateral deviation to the left and pain	35mm

The patient demonstrated opening clicks left side but she stated that was not painful. ROM of mandibular opening is minimally decreased at both sides.

Joint sounds

Sounds are assessed by palpation. See Table 4

Joint site	Right Click: Yes or No	Left Click: Yes or No
Opening	No	No
Closing	No	Yes

Findings;

The patient signs and symptoms were consistent with the diagnosis of myofascial pain with disc displacement and decrease TMJ ROM during the opening. The patient 's most prominent impairments were pain and limitations in the variety of her food intakes, based on size and substance (shew versus soft foods). After the completion of physical therapy assessment, the patient was diagnosed with TMJD along with postural deficits.

Goals: the patient was involved and agreed about the goals.

Short term Goals (two weeks):

1- The patient will be consistent with HEP and attending and completing her physical therapy sessions.

2- By the end of two weeks, the patient will be able to correct her posture by decreasing forward head habit in order to enhance jaw alignment and reduce inflammation of musculature, and will be able to open her mouth within the functional limits for ROM without pain or popping sounds in order to control her opening while talking, eating or yawning.

Long term Goals (4 weeks):

1- The patient will be able to eat her meals within 0/10 pain, and will be able to limit over-opening her jaw while yawning.

2- The patient will be able to open her jaw without deviation and clicking noise while eating or yawning.

Intervention*:* treatment plan

- Physical therapy sessions Twice a week for 6 weeks including: Low Intensity Pulsed Ultrasound (LIPUS) to bilateral TMJ for pain control and inflammation reduction, uses intensity of 1.5 MHz, for 5 min., around the jaw in front of the ears. Care was taken not touch the ear and sub mandibular lymph nodes.
- HEP were performed twice a day with 10 repetitions for each exercises including:

Breathe exercise to release tension. Breathing inhale slowly through the nose for five seconds, while releasing the tension at the jaw completely. The exhale, also for five seconds, try to relax the jaw even further, really concentrating on slackening each muscle that used to chew. (Figure 1)

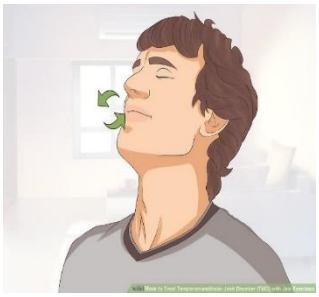

Figure 1: Breathing Exercise

Strengthening exercises to the neck and shoulder musculature to assist in decrease forward head posture and relax the jaw.

1. Chin tucks exercises. With good posture, pull the chin straight back towards the chest, as if trying to make a double chin. Hold the chin tucked position for three seconds. This helps build the muscles surrounding the TMJ, taking some pressure off the joint. (Figure 2)

Figure 2: Chin Tucks exercise

2. Chin tucks with the shoulders back and chest up, pull the chin back creating a "double chin" and hold for three seconds. (Figure 3)

Figure 3: Chin Tucks with shoulder blades adduction

3- Improve the posture. Stand against a wall and tuck the chin, bringing the jaw to the chest, while pressing the shoulder blades together behind the back. This stretches the spine into a more neutral position that can alleviate TMD symptoms and increase jaw mobility. (Figure 4)

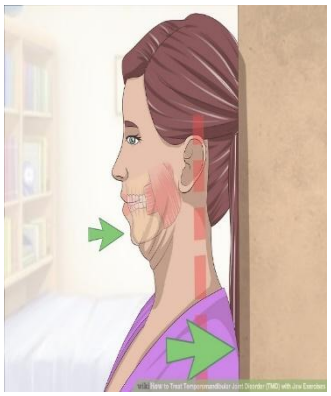

Figure 4: Improve Posture.

4- The controlled jaw opening/closing exercise was completed in front of a mirror. Hold the tongue on the roof of the mouth as slowly open and close the jaw. Place the tongue on the roof of the mouth just behind the front teeth. And the patient actively controlling the lateral deviation to the left side. allowing the muscles to relax. This exercises will control TMJ side rotation. (figure 5).

Figure 5: The controlled jaw opening/closing exercise

5- Apply resistance while opening the mouth. Place two fingers under the chin and press gently, applying a little resistance, while opening the mouth. (figure 6)

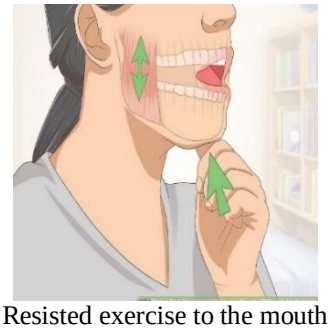

Figure 6: Resisted exercise to the mouth opening .

6- **Apply resistance while closing the mouth.** Open the mouth, and place two fingers under the bottom lip. Press gently, applying a little downward resistance, while closing the mouth. This will help strengthen the jaw muscles to ease the TMD. (figure 7)

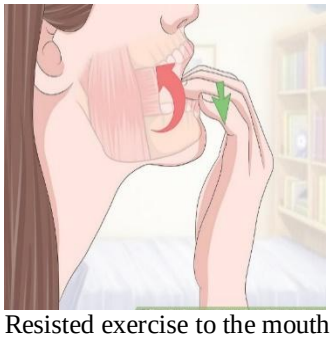

Figure 7: Resisted exercise to the mouth closing .

7- Place an item between the teeth to exercise the jaw with a forward motion. Place an item of, such as a tongue depressor, between the top and bottom teeth. Now, shift the bottom jaw forward to try to point the object towards the ceiling. When the master one object comfortably, gradually increases the thickness to give the greater range of motion. Perform this exercise to increase the mobility in the jaw, such as before a meal. (figure 8)

Figure 8: Resisted exercises

8- Push down on bottom teeth with fingers, and push up with jaw. It helps strengthen the vertical muscles around the TMJ. If one hand isn't enough, use both hands-just doesn't bite down. (Figure 9)

Figure 9: Resisted exercises

- **Relaxation exercises:**

1-Goldfish exercises: One finger on the TMJ joint (try to localize it by where the most discomfort at the hinge of the jaw near the ear.) Then, place one finger from the other on the chin. Drop the mouth open, while applying light pressure against the TMJ. Don't apply resistance on the chin when the mouth is opened. This exercise is to relax the jaw, not strengthen. (Figure 10)

Figure 10: Goldfish exercise.

2- Keep the teeth slightly apart. This will relieve the pressure on the jaw. Put the tongue between the teeth to control clenching or grinding during the day. (Figure 11)

Figure 11: Resting jaw position.

- **Taping**: For reduction of displacement of the jaw taping technique was chosen. By supporting the jaw with a micro pore sticking plaster tape and the sequence of taping procedure as the following anchor **tape** proximal to **TMJ** joint. Apply superior tail with "paper-off " tension diagonally along upper **jaw** toward lower cheek. Instruct patient to open **mouth**, but observe to be sure **jaw** does not sublux or retract. Apply inferior tail with paper-off tension along lower **jaw**.
- **Diet Modifications:** Avoid eating coarse, hard foods that require to bite into them with the front teeth, such as apples, or big bite sandwiches, cut these foods up into small pieces and eat them on the back teeth. Do not chew gum or soft chewy foods that require excessive jaw movements. Avoid Wide Jaw Openings: Excessive movements of the jaw will place stress on the joint and the muscles, such as during yawning.

Outcomes: within 3 weeks (6 sessions) the patient could open her mouth in midline, with minor pain at the jaw's end range of opening. Had normal posture. Within 6 weeks (12 sessions) the patient had full, pain free jaw opening, no clicking during closing of the jaw, the patient was discharged and instructed to continue with HEP and follow the diet modification.
The patient in this case study had great outcomes.

III. Discussion:

A research study found that the use of LPUS with patient who had TMJD was effective and safe[4,5]. A holistic intervention of the physical therapy for the TMJD becomes evident when looking back at this case and literature relating to TMJD. The positive outcomes of pain reduction highlight the importance of physical therapy in treating TMD. Physical therapy offers an alternative to surgical intervention with its many noninvasive treatment options as Melanie confirmed (2017)[6] . Additionally, the physical therapist considered not only treatment for the TMJD, but also assess posture's of the patient and other potential impacts causing the patient's symptoms. Furthermore, the patient in this case study had great outcomes, but we should take in our considerations that the duration of treatment can vary for each patient depending upon the severity of the condition, diagnosis, and compliance with their home exercise program.

IV. Conclusion:

The PT plan of care seemed appropriate for the patient and her condition. The patient's HEP worked well with great compliance by the patient. Overall, the PT treatments that were administered to the patient seemed appropriate and successful for the patient.

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