

GROWING WITH PAIN: A CLINICAL PERSPECTIVE ON PEDIATRIC TEMPOROMANDIBULAR DISORDER

Abstract

Temporomandibular disorders (TMDs) in children and adolescents have gained increasing recognition as an important cause of orofacial pain and functional impairment. The etiology of pediatric TMD is complex and can result from a combination of local, behavioral, developmental, psychological, and systemic factors. Moreover, studies have recently demonstrated that nutritional deficiencies can play a significant role in temporomandibular joint dysfunction during the growing years. This case report describes the occurrence of TMD in a child associated with calcium and vitamin D deficiency.

Temporomandibular disorders (TMDs) in children and adolescents remain underrecognized and are often not routinely identified in clinical practice. Their symptoms may be overlooked or misinterpreted because jaw pain, headache, joint sounds and functional disturbances can overlap with common developmental or other orofacial complaints. Since adolescence is an important period of craniofacial growth, persistent TMD-related pain and dysfunction may have implications for daily functioning and quality of life, and adolescent pain has been associated with a greater risk of persistence into adulthood. Therefore, early screening, accurate diagnosis and timely conservative management are important to prevent pain chronification and functional impairment.

The patient presented with pain in the temporomandibular joint region, clicking sounds in the joint, and functional discomfort during mandibular movements. Clinical examination showed signs suggestive of temporomandibular dysfunction during the mixed dentition stage. Further assessment demonstrated underlying calcium and vitamin D deficiency. Conservative management consisting of patient education, dietary and nutritional correction, habit modification and supportive therapy resulted in symptomatic improvement.

The present case emphasizes the plausible role of metabolic and nutritional factors in the development and progression of TMD in children. Vitamin D and calcium deficiencies may deleteriously affect condylar remodeling, alterations in bone metabolism, muscle function and inflammatory process, thereby predisposing individuals to temporomandibular dysfunction. Early diagnosis of contributing systemic conditions, along with comprehensive conservative management, can bring about favorable clinical outcomes and can protect the craniofacial region from late sequelae.

This report emphasizes the importance of considering nutritional evaluation in children presenting with temporomandibular disorders, particularly in the absence of significant traumatic or occlusal etiologies.

Introduction

Temporomandibular disorders (TMDs) comprise a spectrum of conditions involving the temporomandibular joint, surrounding musculature, and the associated craniofacial structures. Clinically, the symptoms may vary and can include pain, joint sounds, restricted mandibular movement, and functional discomfort during mastication or speech. Although TMD has traditionally been considered as a condition affecting adults, increasing evidence indicates that children and adolescents are also affected^{1,2}.

The etiology of TMD is multifactorial and often involves complex interactions among local, systemic, behavioral, and psychosocial factors in children and adolescence. Trauma to the jaw, parafunctional habits such as clenching and bruxism, emotional stress, and developmental anomalies have all been implicated in the onset and progression of TMJ dysfunction. Systemic conditions, including juvenile idiopathic arthritis and connective tissue disorders, may implicate to contribute TMJ involvement in children^{3,4}.

Several local factors have been found to predispose children to TMD. Malocclusions, such as deep bite, posterior cross bite, and Angle's Class II or III relationships, can alter mandibular function and increase the stress on the temporomandibular joint. Additionally, parafunctional habits, such as gum chewing, nail biting and tooth clenching, may result in excessive muscular activity and cause strain on the joint. Repetitive micro trauma and as well as direct trauma to the jaw can have potential to compromise joint stability and function. Other contributing factors include joint hypermobility, occlusal wear and prolonged periods of mouth opening during dental procedures⁵.

The mixed dentition phase is a crucial stage in craniofacial development, as the stomatognathic system constantly undergoes continuous adaptation. Eruption of permanent teeth, shedding and retention of primary teeth, and transient occlusal discrepancies may lead to altered mandibular posture and function. Such changes can cause increased muscular activity and joint loading, thereby predisposing susceptible individuals to TMJ disorders. Clicking sounds in the joint, mandibular dysfunction and muscle tenderness have been found in fairly high frequency during this transition stage⁶.

In recent years, attention has been ushered towards the role of nutritional and metabolic factors in musculoskeletal disorders, including TMD. Calcium and Vitamin D are essential for normal skeletal growth, bone health and homeostasis, neuromuscular function, and the maintenance of joint integrity^{7,8}. Nutritional deficiency during this active period of skeletal development can adversely affect condylar remodeling and muscle function, and predispose individuals to temporomandibular dysfunction⁹. vitamin D deficiency is associated with increased inflammatory activity and decreased bone mineral density, influencing TMJ health^{10,11,12}.

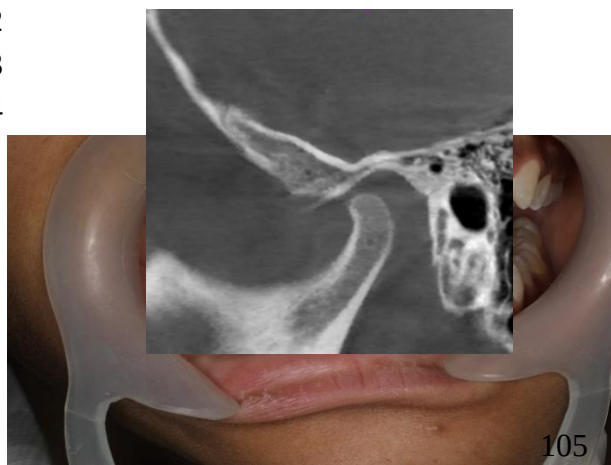
Prevalence rates of TMD in children and adolescents have been found to vary considerably across studies due to differences in the diagnostic methods and study populations. Prevalence rates reported in the systematic reviews range from 7.3% to 30.4% in 10–19 years, with a higher frequency observed in females, especially in adolescence^{13,14}.

Despite increasing awareness of TMD in children and adolescence, the possible attribution of nutritional deficiencies remains inadequately explored. This case report describes TMD in a child with local contributing malocclusion with retained deciduous tooth along with associated calcium and vitamin D deficiencies and highlights the importance of considering underlying metabolic factors during clinical evaluation and management.



ORTHOPANTOGRAPH

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UNDER PEER REVIEW IN



VIJAYA DIAGNOSTIC CENTRE
3-4-18 & 17, Street No. 19, Opp. Lane to Tanishq, Chandra Nagar, Hitec City, Hyderabad - 500029

TEST REPORT

MR. SYEDA JAFFERI BEGUM
 Age: Gender : 12 Years / Female
 Registration ID : 250710018454
 Ref. By : Dr. FAISAL ZARDI
 Sample Type : Serum

Registered on : 03-Jun-2025 13:55
 Collected on : 03-Jun-2025 13:58
 Released on : 04-Jun-2025 09:22
 Printed on : 11-Jun-2025 10:26
 Regn Centre : Chandrayangutta - 71

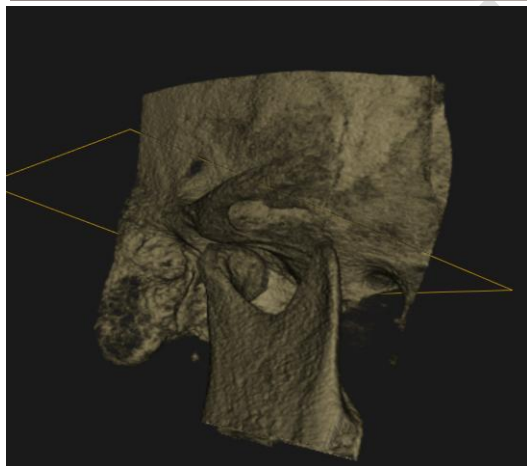
VITAMIN D TOTAL (D2 + D3)			
TEST NAME	RESULT	UNIT	BIOLOGICAL REFERENCE INTERVAL
25 (OH) VIT D2 Ergocalciferol Method: LC/MS/MS	1.05	ng/mL	NA
25 (OH) VIT D3 Cholecalciferol Method: LC/MS/MS	10.04	ng/mL	NA
Vitamin D total (D2+D3) Method: Calculation	11.09	ng/mL	Deficiency : < 20 Insufficiency : 20 - 29 Sufficiency : 30 - 100 Toxicity : > 100

Interpretation / Comments :

- Vitamin D is a steroid hormone involved in the intestinal absorption of calcium and regulation of cal hemostasis.
- Vitamin D is essential for the formation and maintenance of strong, healthy bones.
- 25 OH Vitamin D is the major circulating form of Vitamin D and precursor of active form of 1,25 di hydroxy vitamin D.
- Vitamin D occurs in two forms, D2 ergocalciferol (plant origin) and D3 cholecalciferol (sunlight origin) in the body.
- Vitamin D deficiency can result from inadequate exposure to the sun, inadequate alimentary intake, decreased absorption, abnormal metabolism or vitamin D resistance. Recently many chronic disease such as cancer, high blood pressure, osteoporosis and several autoimmune diseases have been linked to vitamin D deficiency.
- 25(OH) vit-D is a reliable indicator of the Vitamin D status because the serum or plasma levels of it reflect the storage levels of vitamin D in our body. Lower levels of 25(OH) vit - D correlates with the clinical symptoms of vitamin D deficiency.
- Vitamin D2 and vitamin D3 added together is total vitamin D.

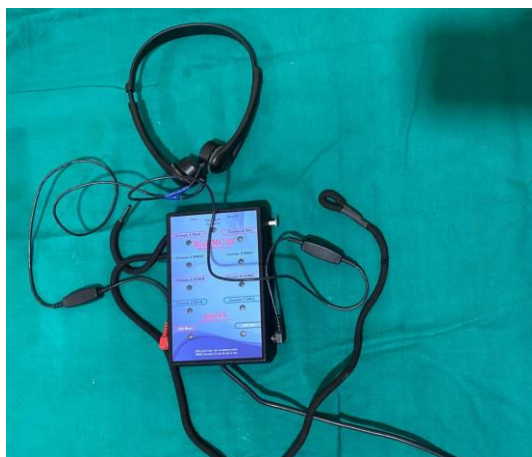

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CBCT RIGHT TMJ



JOINT VIBRATION ANALYSIS APPARATUS

CASE REPORT

The 11 years old female patient was referred to the Department of Neuromuscular Dentistry at Sri Sai College of Dental Surgery, Vikarabad in April 2025 because of pain in the right side of face and clicking sound during opening and closing of jaw which increased with mastication or jaw movement. There was no relevant medical history or no history of sudden trauma but she was having pain since 6 months.

CLINICAL EXAMINATION

EXTRAORAL EXAMINATION:

During clinical examination facial asymmetry was seen due to hypertrophy of right masseter muscle. Extra oral palpation of muscles right anterior temporalis and right masseter provoked the familial type of pain but palpation of lateral pole of right and left condyle did not produce pain. Closing click of the right TMJ were detected. Unassisted Mouth opening of 40 mm was reported with severe pain in TMJ and muscles of mastication. During mouth opening more than 2mm of deflection to the right side was present. Patient reported pain in the right TMJ during lateral exertion. Left lateral movement was 10 mm while right lateral movement was 6 mm without pain. The amount of protrusion was 5 mm. Opening, closing and protrusion of the mandible provoked pain. Patient self-assessed the level of pain using visual analogue scale as 8 (VAS 0-10).

DENTAL STATUS AND INTRAORAL EXAMINATION

Intraoral examination reveals no signs of any inflammation in gingiva and oral mucosa. Dental examination revealed that the patient is having 27 permanent erupted teeth except wisdom teeth (18, 28, 38, and 48). The right lower 2nd premolar was not fully erupted and it was

lingually positioned because of the retained deciduous 2nd molar of the same quadrant. Vertical overbite was 4 mm and horizontal overjet amounted 2mm.

RADIOLOGICAL EXAMINATION

New version of Research diagnostic criteria for TMD DC/TMD enables standardization of most common forms of TMD associated with muscles and joints. Since the clinical signs and symptoms are not always the clear indication of any joint diseases, correct diagnosis is mandatory by clinical evaluation supported by 2D (panoramic radiograph) and 3D imaging (CBCT). CBCT is a recent method to visualize hard tissue changes with a relatively low radiation dose. MRI is the gold standard in the diagnosis of the articular disc derangements.

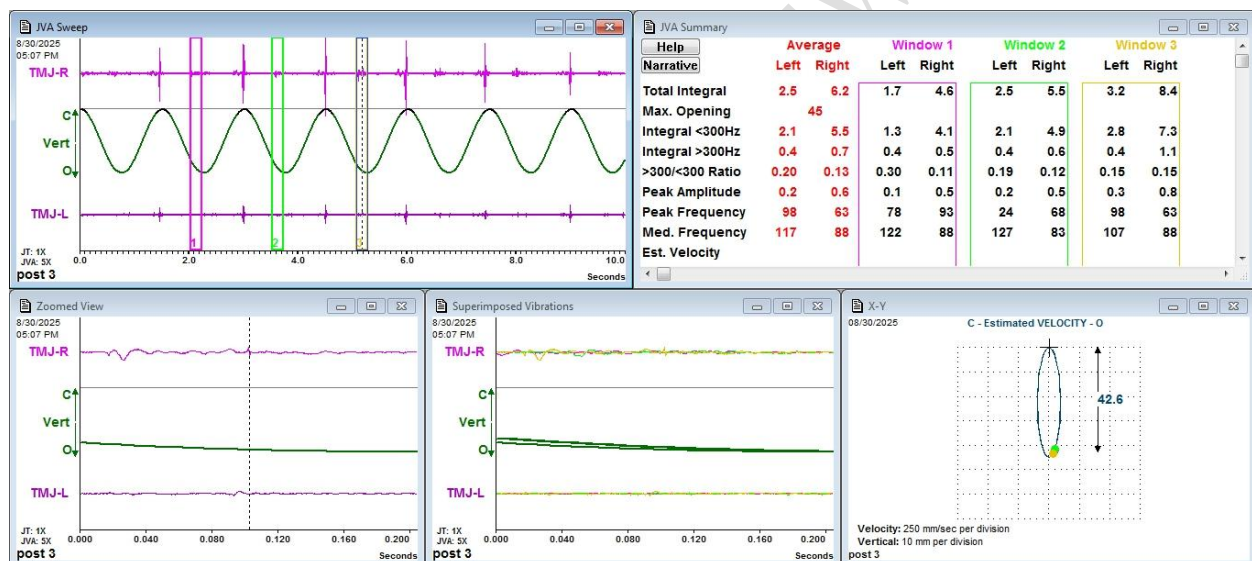
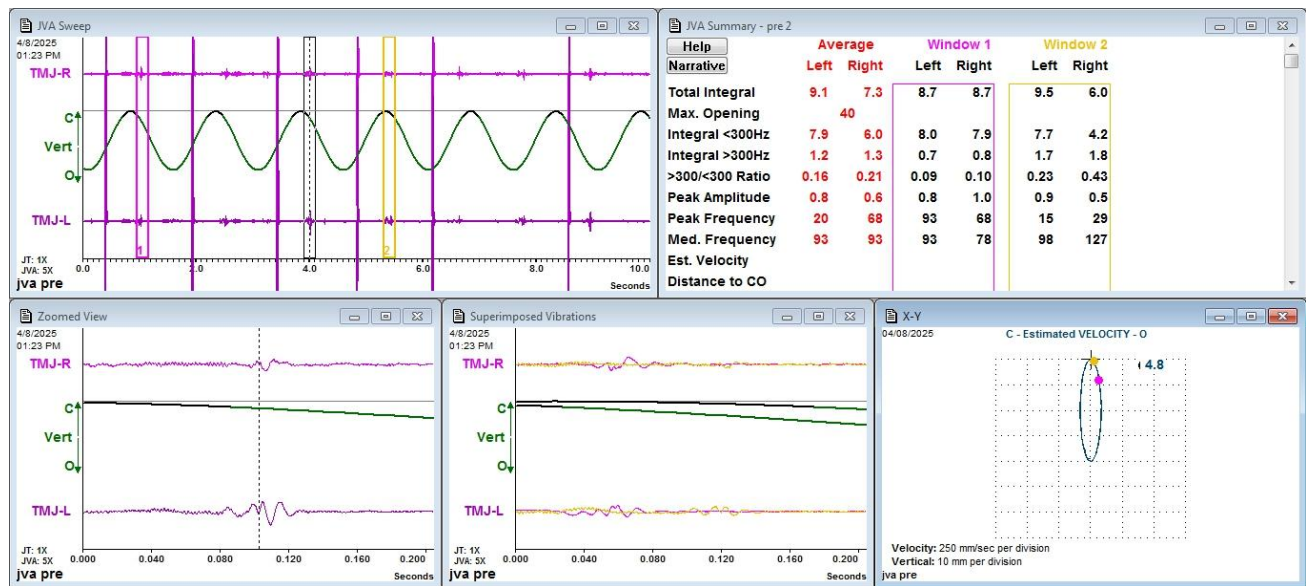
Panoramic radiograph showed no signs of any bony changes in condyles bilaterally. All permanent teeth are erupted. Four wisdom teeth are visible but they are impacted. Root formation of all teeth except wisdom teeth is completed. Furthermore CBCT revealed some erosive changes in the right condyle head with mild flattening and reduced joint space in relation to the right TMJ. MRI was not performed as the patient was not willing for it.

Blood investigations/ Systemic evaluation revealed severe Vitamin D deficiency 11.09 ng/ml , Serum Calcium 8.1 mg/dl, serum magnesium 1.2 mg/dl and Vitamin B12 126 pg/ml.

BIO JVA is a diagnostic tool for recording of vibrations of TMJ during functional movements (during opening and closing.

The pre and post treatment joint vibration analysis parameters are mentioned below with the JVA readings in the sweep format:

Bio JVA parameters	Pre-operative		Post-operative	
	Left	Right	Left	Right
Total integral	9.1	7.0	2.5	6.2
Integral < 300	7.9	6.0	2.1	5.5
Integral >300	1.2	1.3	0.4	0.7
Peak Amplitude	0.8	0.6	0.2	0.6
Peak frequency	20	68	98	63
Median Frequency	93	93	117	88
Max mouth opening	31mm		40mm	



DIAGNOSIS : based on the clinical findings , radiographic impression and the JVA analysis a diagnosis of chronic disc derangement in the right TMJ, myalgia in relation to the right lateral pterygoid muscle and masseter musclewith nutritional deficiencies was given.

Treatment plan

Extraction in relation to the retained deciduous molar was performed after two week of prescribed muscle relaxants and physiotherapy sessions. Physiotherapy sessions included TENS and ULTRASOUND therapy biweekly. Stabilization splint was fabricated in the

therapeuticcentric relation position with increase of the verticaldimension of occlusion of 3 mm for the maxillary arch. Patient was instructed to wear a splint during night for the following 3 months.

Patient was prescribed Vitamin D, Vitamin B12 and Calcium supplements for 3 months .

The patient was managed conservatively with a stabilization splint and was advised to wear the splint regularly during the night. The patient was recalled at 15-day intervals to assess symptom progression, compliance with splint therapy, mandibular movements, and temporomandibular joint function.

At the 3-month follow-up, the patient reported marked symptomatic improvement, with substantial reduction in pain following regular nighttime splint wear. The patient stated that pain occurred only very rarely, particularly during prolonged gum chewing. However, when the splint was worn only occasionally, the patient experienced recurrence of headache and difficulty while chewing hard foods, indicating a close association between regular splint use and symptomatic relief.

On clinical examination, mild deviation of the mandible during mouth opening was observed, and a mild clicking sound was detected in the right temporomandibular joint. No significant tenderness was noted. Overall, the patient demonstrated progressive improvement in pain and functional symptoms with continued conservative management and regular splint use.

The patient was therefore advised to continue regular nighttime splint wear and maintain periodic follow-up to monitor mandibular function and temporomandibular joint symptoms.

Discussion

Temporomandibular disorders in children frequently remain unrecognized because symptoms are often mild, intermittent, or attributed to normal development changes. Persistent temporomandibular joint dysfunction during the growth period may impact mandibular development, oral function, and overall quality of life. Therefore, the early identification of contributing factors is essential for timely and appropriate management.

TMD is recognized as being influenced by an interplay of mechanical, behavioral, psychological, and systemic factors. In the present case, local contributing malocclusion with nutritional

deficiency were relevant contributing factors. Calcium and vitamin D are essential for skeletal growth and development as they support proper bone mineralization and remodeling thereby contributing to maintenance of musculoskeletal health. Vitamin D deficiency may impair calcium absorption and mineralization, potentially altering the condylar growth and neuromuscular function.

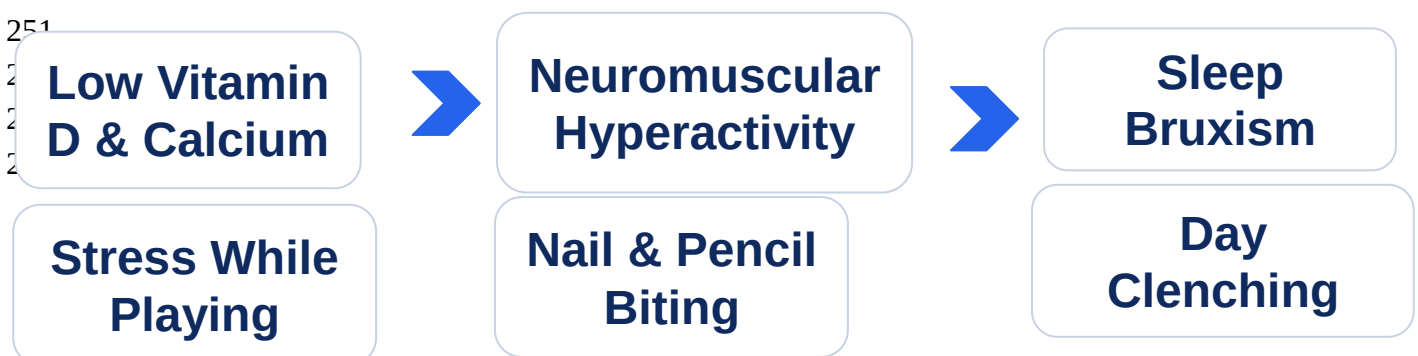
The temporomandibular joint undergoes continuous remodeling throughout growth and adapts to the functional demands placed upon it. Inadequate mineral availability during this phase may compromise adaptive remodeling and alter the biomechanics of the joint. Furthermore, vitamin D also plays a role in the regulation of inflammation and deficiency has been noted to correlate with elevated inflammatory markers. These mechanisms may contribute to muscle tenderness, discomfort in the joint and functional limitations in affected individuals.

Previous studies on pediatric TMD have largely focused on trauma, parafunctional habits, malocclusion, and psychosocial stress. Little focus has been given to metabolic and nutritional disturbances as a contributing factor for disease progression and symptom severity. In children without a significant traumatic or occlusal history, the evaluation of nutritional status may provide additional clinical insights.

Treatment of TMD in children ideally involves conservative modalities with. patient education, habit modification, physiotherapy, dietary counseling, and supportive pharmacologic therapy continue to be the basis of treatment¹⁵. Symptomatic improvement in the present case, following the correction of calcium and vitamin D deficiency, together with conservative TMJ management, suggests a plausible correlation between nutritional imbalance and temporomandibular dysfunction.

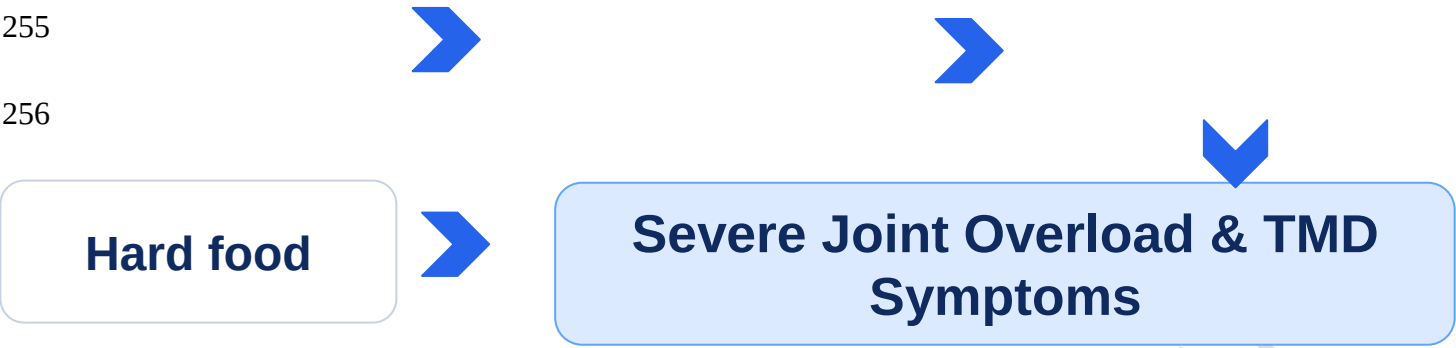
This case reiterates the necessity for a comprehensive multidisciplinary approach to the evaluation of TMD in children. Early recognition and intervention may help reduce the risk of chronic dysfunction and long-term complications of the craniofacial complex.

PROPOSED PATHOGENETIC FLOW OF PEDIATRIC TMD



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Hard food

**Severe Joint Overload & TMD
Symptoms**

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264 **Enables early detection of TMD in children and adolescents.**

265 **Prevents progression of pain, dysfunction and growth alterations.**

266 **Helps in accurate differential diagnosis of orofacial pain conditions.**

267 **Guides appropriate conservative management and monitoring.**

268 **Improves quality of life and prevents long-term complications.**

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270 **Children don't always complain—they adapt to pain. It is our responsibility to recognize it**
271 **early.**

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273 **Conclusion**

274 Temporomandibular disorders in children are multifactorial and may impact oral function,
275 mandibular development, and quality of life if left unrecognized. While local factors like

malocclusion, trauma and parafunctional habits remain important contributors, this case highlights the potential influence of calcium and vitamin D deficiency in the development of temporomandibular dysfunction during the growth. Nutritional deficiencies may impair bone metabolism, condylar remodeling, and neuromuscular function, thereby increasing susceptibility to TMJ-related symptoms.

Early diagnosis, comprehensive clinical evaluation, and identification of underlying systemic or metabolic factors are essential for successful management of pediatric TMD. Conservative and multidisciplinary management, including nutritional correction and supportive TMJ therapy, may result in significant symptomatic improvement and help prevent long-term functional complications. Further clinical studies are needed to explore the relationship between nutritional deficiencies and temporomandibular disorders in children and adolescents.

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