Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Contemporary Orthodontics

Journal homepage: https://www.jco-ios.org/

Case Report

Functional shifts in orthodontics: A case report

Annapurna Kannan[1]*, Bhadrinath Srinivasan[1], Vignesh Kailasam[1]

[1]Dept. of Orthodontics and Dentofacial Orthopaedics, Sri Ramachandra Dental College and Hospital, SRIHER (DU), Ramachandra Nagar, Porur, Chennai, Tamil Nadu, India.

Abstract

Functional shifts in mandibular positioning can influence occlusion, temporomandibular joint (TMJ) health, and orthodontic outcomes. Conditions such as disc displacement with reduction, TMJ dislocation, disc displacement without reduction, myositis/myospasms, and osteoarthritis often receive significant attention. However, functional shifts—a potential precursor to many of these disorders—are frequently overlooked. Functional examination is a vital tool for identifying subtle indicators of TMJ dysfunction, particularly in cases without obvious pathology. Research demonstrates that accurate diagnosis and management of functional shifts can restore equilibrium between condylar positioning and occlusion, thereby reducing the risk of long-term joint damage. This case report examines a patient with functional shift and malocclusion, detailing their diagnostic evaluation, intervention, and post-treatment outcomes. The report also highlights the importance of incorporating functional diagnostics into routine orthodontic practice to optimize treatment outcomes and ensure long-term stability. The findings of this case report highlight the role of functional analysis in achieving stable occlusal and TMJ health, emphasizing its importance in orthodontic care.

Keywords: Functional shift, Temporomandibular joint, Mandibular Positions.

Received: 03-03-2025; **Accepted:** 03-07-2025; **Available Online**: 07-08-2025

1. Introduction

Conditions such as disc displacement with reduction, TMJ dislocation, disc displacement without reduction, myositis/myospasms, and osteoarthritis often receive significant attention.[1] However, functional shifts—a potential precursor to many of these disorders—are frequently overlooked.

The functional positioning of the mandible is critical for maintaining harmony between the teeth, temporomandibular joint (TMJ), and associated musculature.[2] Functional shifts, which are deviations in mandibular movement during closure or at rest, can disrupt this balance, leading to malocclusion and increasing the risk of temporomandibular disorders (TMD). These shifts often stem from premature occlusal contacts, asymmetrical growth, or habitual posturing. Addressing functional shifts through orthodontic treatment is essential not only for achieving esthetic alignment but also for enhancing the biomechanical stability of the orofacial system.[3,4]

Functional examination is a vital tool for identifying subtle indicators of TMJ dysfunction, particularly in cases without obvious pathology. Research demonstrates that accurate diagnosis and management of functional shifts can restore equilibrium between condylar positioning and occlusion, thereby reducing the risk of long-term joint damage.[5]

Functional examination involves evaluating the mandible during function, assessing orofacial function, examining the teeth, and analyzing the TMJ and muscles of mastication. The path of closure should be examined sequentially: from the postural rest position, to initial/premature contact (free phase), and finally to the habitual occlusal position (articular phase). A functional shift may occur during these phases, making it essential to

*Corresponding author: Annapurna Kannan
Email: annapurnakannan@gmail.com

https://doi.org/10.18231/j.jco.v.9.i.3.20

differentiate between laterognathy and latero-occlusion during analysis.[2,6]

This case report explores the evaluation and correction of functional shifts, emphasizing its relationship with the occlusal dynamics.

2. Case Report

2.1. Pretreatment evaluation

A 15-year-old female patient presented with a chief complaint of irregularly aligned teeth. Extraoral examination revealed a convex profile with no apparent facial asymmetry. Intraoral examination revealed a palatally positioned 22, bilateral end-on canine relationships, a class II molar relationship on the left side, a class I molar relationship on the right side and a 1.5 mm shift of the lower midline to the left during maximum intercuspation. However functionally, the upper and lower midlines were coinciding at rest. (**Figure 1**).

Figure 1: Upper: Intraoral pictures- right occlusion, anterior occlusion and left occlusion **Middle:** Midline at rest and maximum intercuspation **Lower:** Extraoral pictures- frontal and profile views.

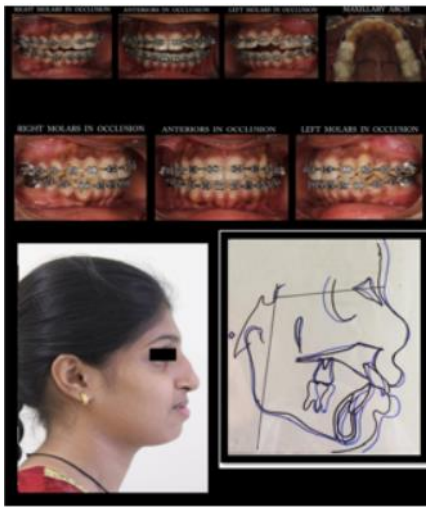

Figure 2: Upper: Intervention **Middle:** Intraoral pictures - Post correction of functional aberrations **Lower:** Extraoral profile pictures - Post correction of functional aberration and Superimposition.

Figure 3: Intraoral pictures - Post 4 years follow up

2.2. Intervention

The treatment plan in this case was to align the palatally positioned 22 and use a posterior bite plane to disocclude the mandible. Remarkably, after the correction of 22, the left-side end-on relationship improved to a Class I relationship and the lower midline shift improved, without any other intervention. This change likely resulted from relieving inherent functional retrusion and a transverse shift that probably got resolved with aligning 22 and disoccluding the mandible. This was further confirmed by the automatic improvement in the facial profile to a staright profile as well as the superimposition. (**Figure 2**).

The case was followed up for an additional 48 months post-treatment, and occlusion remained quite stable. Functional assessment at follow-up confirmed a reduction in midline shift, suggesting long-term stability of the correction. (**Figure 3**)

3. Discussion

Functional shifts, often overlooked in traditional orthodontic diagnostics, have profound implications for TMJ health and overall occlusal stability.[7] This case report highlights the need for detailed functional assessments as part of orthodontic treatment planning. In this case, functional abberations were successfully identified and corrected, leading to enhanced treatment outcomes and long-term stability. The case was treated as non- extraction with accordance to previous literature.[8]

The interplay between functional shifts and TMD has been extensively debated in the literature. McNamara and Okeson emphasized that while achieving an ideal gnathological occlusion may not always be feasible, ensuring functional harmony significantly reduces the risk of TMD symptoms. Roth's philosophy further underscores the importance of achieving proper intercuspation with condylar seating to maintain occlusal and joint health.[9]

This case report highlights the importance of incorporating functional diagnostics into routine orthodontic practice to optimize treatment outcomes and ensure long-term stability.

4. Conclusion

This case report underscores the importance of functional shift evaluation in orthodontic treatment. By addressing them, practitioners can achieve stable occlusion and prevent TMD, advancing patient outcomes in functional and esthetic domains. Future orthodontic protocols should incorporate systematic functional assessments to optimize patient care and long-term stability.

4.1. Data availability statement

The data used in the current study is available with the corresponding author on request.

4.2. Author contributions

AK - conception, acquisition, analysis, interpretation drafting the work, BS – design of the work and supervision, VK - design of the work and supervision.

5. Ethics Approval and Consent to Participate

Ethical approval was not required for this case report as it is not a study. Informed written consent was obtained from the patient for publication of photographs and radiographs.

6. Source of Funding

None.

7. Conflicts of Interest

The authors declare no conflicts of interest.

8. Acknowledgement

The authors would like to thank the Department of Orthodontics for providing the records.

References

1. Aldayel AM, AlGahnem ZJ, Alrashidi IS, Nunu DY, Alzahrani AM, Alburaidi WS, Alanazi F, Alamari AS, Alotaibi RM. Orthodontics and Temporomandibular Disorders: An Overview. *Cureus.* 2023;15(10):e47049.
2. McHorris WH. Occlusion with particular emphasis on the functional and parafunctional role of anterior teeth. Part 1. *J Clin Orthod*. 1979;13:606-20.
3. Chen Q, Mai ZH, Lu HF, Chen L, Chen Z, Ai H. Treatment of a mandibular functional shift in an adolescent boy with temporomandibular disorder and crossbites. *Am J Orthod Dentofacial Orthop*. 2015;148(4):660-73.
4. Abdelrehim MAEF, Ghali RM, Bahig DE. Evaluation of the effect of low level LASER therapy versus printed occlusal splint on mandibular movements in patients with TMJ muscular disorders by using ARCUS digma. *Ain Shams Dent J.* 2022;25(1):26-34.
5. Kannan A, Padmanabhan S. Orthodontic diagnosis and management of TMJ–A case report. *Sri Ramachandra J Health Sci.* 2023l;2(2):69-72.
6. Okeson JP. Management of Temporomandibular Disorders and Occlusion. St. Louis, Mo: Elsevier; 1989.
7. McNamara JA Jr, Seligman DA, Okeson JP. Occlusion, Orthodontic treatment, and temporomandibular disorders: a review. *J Orofac Pain*. 1995r;9(1):73-90.
8. McLaughlin RP, Bennett JC. The extraction-nonextraction dilemma as it relates to TMD. *Angle Orthod*. 1995;65:175-86.
9. Nanda R, Margolis MJ. Treatment strategies for midline discrepancies. *Sem in Orthod*. 1996;2(2):84-9.

Cite this article: Kannan A, Srinivasan B, Kailasam V. Functional shifts in orthodontics: A case report. *J Contemp Orthod.* 2025;9(3):417-419.