Medical and Research Publications
International Open Access

Case Report **Journal of MAR Dental Sciences (Volume 6 Issue 4)**

Cone Beam Computed Tomography as A Surgical Guide for Impacted Mandibular Second Molar: A Radiographic Perspective

Preethy Mary Donald *

Corresponding Author: Preethy Mary Donald, Department of Oral Medicine and Oral Radiology, Faculty of Dentistry, Manipal University College Malaysia, Melaka, Jln Batu Hampar, Bukit Baru - 75150, Malaysia.

Received Date: November 25, 2022

Published Date: December 01, 2022

Abstract

Impacted teeth often pose challenges for the orthodontists and surgeons. Early diagnosis and treatment paves way for improved oral function and health for the patient. Most commonly seen impacted teeth includes mandibular third molars, maxillary canines and maxillary second premolars. This paper narrates the importance and requirement of CBCT for evaluating a horizontally impacted lower second molar which is a rare presentation. The paper also highlights about the treatment options available, and the risks involved if it is left untreated.

Keywords: *Impacted lower second molar, orthodontic mesialization, CBCT*

Introduction

Impaction implies the failure of tooth to erupt naturally into the allocated space in dental arch within the stipulated eruption time. The primary causes of impaction can be attributed to crowding due to small size of dental arch, displacement of tooth follicle, retention, or premature exfoliation of primary teeth. In dental practice, the most affected teeth are mandibular third molars, maxillary canines and maxillary second premolars. It is also common to see impacted supernumerary teeth. **(**1**)**

Molar impaction treatment is quite challenging owing to two reasons. Firstly, accessibility in the posterior region is limited and manoeuvring with the instruments is a difficult task and requires experience and expertise. **(**2**)** However, this case report highlights importance and role of CBCT for surgical evaluation of impacted mandibular second molar which is quite unusual.

Case Report

A 15-year-old girl who was under orthodontic treatment was sent for CBCT for evaluation of right lower back teeth. Clinically, tooth #47 was unerupted. The diagnostic objective of taking CBCT was to aid in surgical removal of impacted #47 and to mesialise #48 towards distal side of #46.

Images were acquired using Planmeca ProMax 3Ds imaging unit **(**Helsinki, Finland**)**. Reconstructed panoramic image shows presence of #43, #44, #45, #46 and #48. Tooth #47 was horizontally impacted with its crown directed towards roots of #46. **(**Figure 1**)** To locate the mandibular nerve, nerve tracing was done using Planmeca Romexis software 3.01R. Cross-sectional slices were adjusted in relation to tooth #47 which permitted clear visualization of the canal and nerve tracing was done using the nerve tool. Mesial and distal root of #47 was in close proximity with the mandibular canal. **(**Figure 2**)**.

The crown of impacted #47 showed a peri-coronal follicular space which is less than 3mm as seen in coronal and axial section which is suggestive of a dental follicle. Coronal section also showed sufficient clearance of distal root tip of #46 from the follicular space of #47 **(**Figure 3**).** Axial section showed that the impacted tooth #47 is more buccally placed. **(**Figure 4**)**

Cross-sectional images showed adequate clearance of tooth #48 from the roots of impacted #47. **(**Figure 5**)** The 3D rendering model which permits explicit visualization and precise location of the impacted tooth. **(**Figure 6**)** This provides the surgeon a complete virtual guidance prior to surgical intervention. Surgical evaluation of impacted #47 with due considerations to vital anatomical structures and adjacent teeth was recommended.

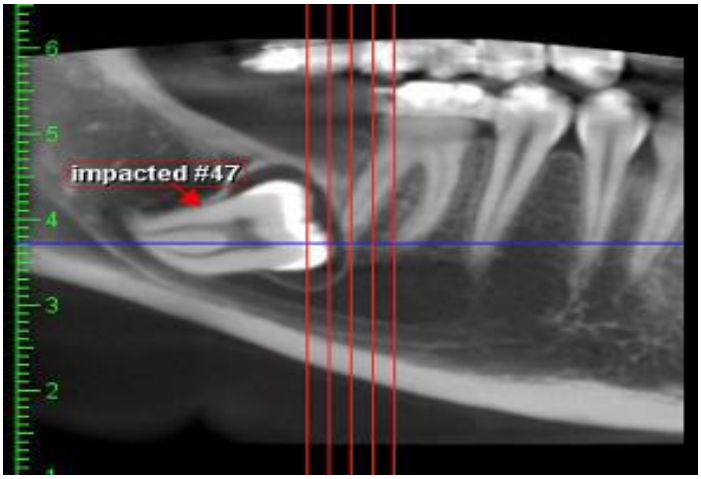

Figure 1 Reconstructed panoramic image shows - presence of horizontally impacted lower second molar

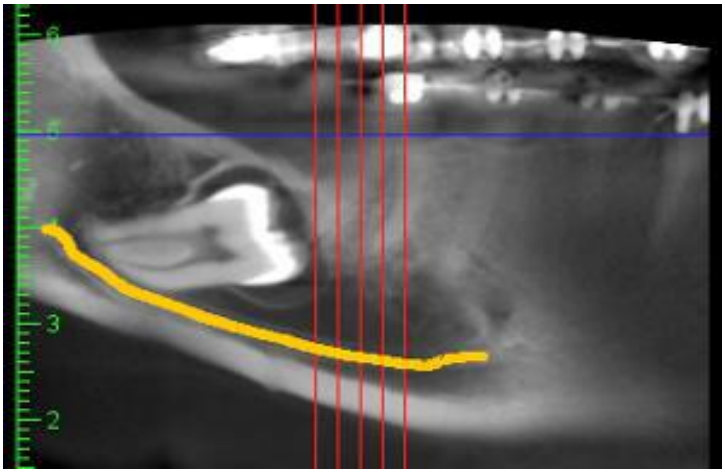

Figure 2 Sagittal section shows close proximity of roots of #47 with inferior alveolar canal

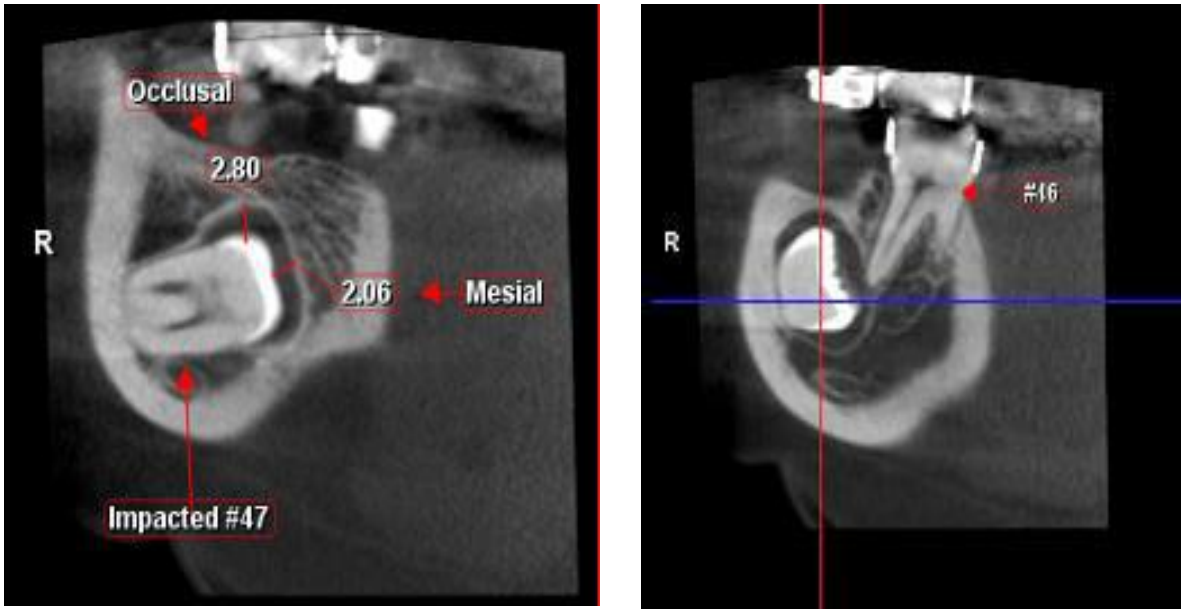

Figure 3 Coronal section shows follicular space measurements in relation to #47 and its relationship with distal root of #46

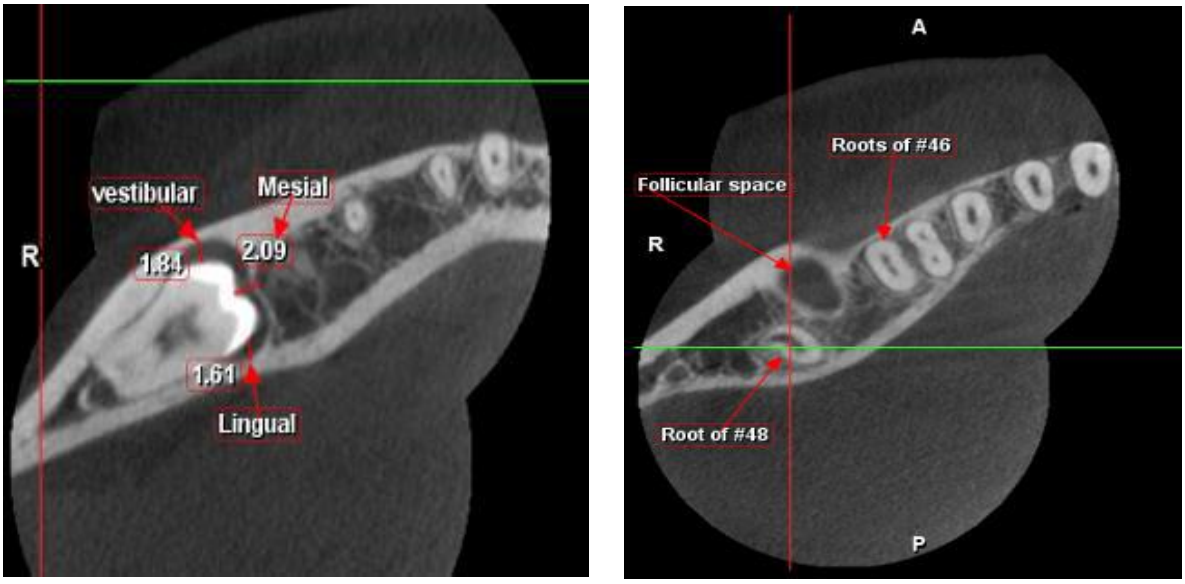

Figure 4 Axial section shows #47 with follicular space measurements and its relationship with #46 and #48.

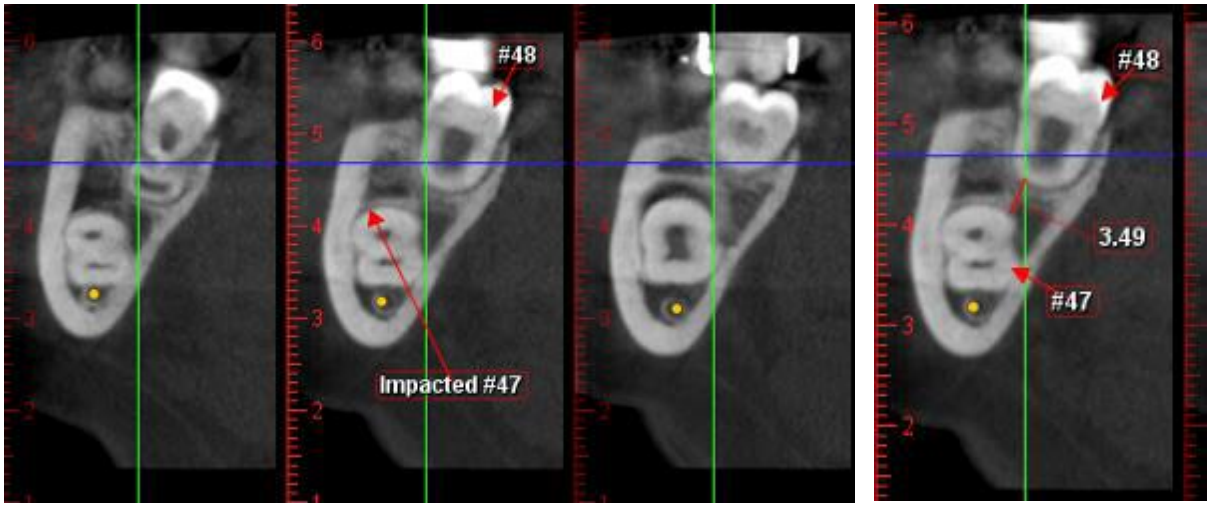

Figure 5 Cross-sectional image showing relationship of tooth #48 with the impacted tooth #47.

Figure 6 3D reconstruction shows position of impacted #47.

Discussion

Second molar impaction is usually rare. Overall prevalence ranges from 0.06 to 0.3%. This condition is usually asymptomatic and often surfaces as an incidental finding either through a routine dental screening followed by a panoramic radiograph or when these patients seek for an orthodontic consultation. **(**2, 3**)**

Prime causative factor of second molar impaction could be due to insufficient space in the dental arch. **(**4**)** Broadly, interferences in the eruptive pathway of second molar could be attributed to local and systemic factors. Local factors include premature loss of primary molars, hinderances in the pathway of eruption such as a dental cyst or tumour, anomalies of second molar such as short root anomaly, ectopic position and ankylosis of primary molars. **(**5**)**

Systemic factors include patients who are diagnosed with syndromes may manifest with multiple impacted teeth. **(**6**)** In this case, the patient is normal and healthy and the impaction is unilateral without any root deformities. Studies also indicate that if a third molar dental follicle is above the occlusal table of developing or impacted second molar crown, the risk of impaction of second molar will be higher. **(**2**)** However, in this case, the patient's lower third molar was erupted.

The mainstay of treatment for impacted second molar includes two options: Firstly, uprighting the impacted tooth through orthodontic or surgical procedures **(**7**)** and the second option is extracting the impacted tooth followed by a prosthetic rehabilitation or an orthodontic mesialization procedure. **(**5**)** It is quite challenging to choose from either of these treatment options which may benefit the patient. In this case, the practitioner has planned to extract the impacted second molar followed by mesializing the erupted third molar towards the distal side of lower first molar.

Although, it is an asymptomatic case, it is ideal to treat the condition as an impacted lower second molar left untreated may result in pericoronitis, development of caries, malocclusion, supraeruption of opposing upper second molar and loss of periodontal attachment of roots of lower first molar. **(**8**)**

Panoramic radiographs do give an overview of all teeth and adjacent structures. However, the precise location of impacted tooth cannot be assessed using a panoramic radiograph and moreover this 2D image comes with other inherent limitations such as magnification, distortion, superimposition of structures and artifacts. **(**10**)**

CBCT is a high precision imaging tool with low radiation dose and provides submillimeter resolution images which can be used as a pre-operative assessment for impacted teeth. It is essential for making a correct diagnosis, to assess bucco-lingual location of impacted tooth, relationship and root resorption of adjacent teeth. **(**10**)** CBCT also aids as a surgical guide for all clinicians prior to any intervention. **(**11**)** Furthermore, it aids in assessing the proximity of impacted teeth to vital anatomical structures such as inferior alveolar canal that could interfere with uprighting or surgical intervention. **(**12**)** Overall, CBCT has aided this case in diagnosis, decision making and treatment planning.

References

1. Santosh P. Impacted Mandibular Third Molars: Review of Literature and a Proposal of a Combined Clinical and Radiological Classification. Ann Med Health Sci Res. 2015 Jul-Aug;5**(4)**:229-34. doi: 10.4103/2141-9248.160177.

2. Tamer İ, Öztaş E, Marşan G. Up-to-Date Approach in the Treatment of Impacted Mandibular Molars: A Literature Review. Turk J Orthod. 2020 May 21;33**(**3**)**:183-191. doi: 10.5152/TurkJOrthod.2020.19059.

3. Owen AH., III Early surgıcal management of impacted mandibular second molars. J Clin Orthod. 1998;32:446–50

4. Cho SY, Ki Y, Chu V, Chan J. Impaction of permanent mandibular second molars in ethnic Chinese schoolchildren. J Can Dent Assoc. 2008;74:521

5. Chang CH, Lin JS, Roberts WE. Ramus screws: the ultimate solution for lower impacted molars. Semin Orthod. 2018;24:135–54

6. Frazier-Bowers SA, Simmons D, Koehler K, Zhou J. Genetic analysis of familial non-syndromic primary failure of eruption. Orthod Craniofac Res. 2009;12:74–81.

7. Sabuncuoglu FA, Sencimen M, Gülses A. Surgical repositioning of a severely impacted mandibular second molar. Quintessence Int. 2010;41**(**9**)**:725-9.

8. Kravitz ND, Yanosky M, Cope JB, Silloway K, Favagehi M. Surgical Uprighting of Lower Second Molars. J Clin Orthod. 2016;50:33–40

9. Alhummayani FM, Mustafa ZA. A new guide using CBCT to identify the severity of maxillary canine impaction and predict the best method of intervention. J Orthod Sci. 2021 Feb 19;10:3.

10. Scarfe WC, Farman AG. What is cone-beam CT and how does it work? Dent Clin North Am. 2008 Oct;52**(**4**)**:707-30

11. Matzen LH, Wenzel A. Efficacy of CBCT for assessment of impacted mandibular third molars: a review - based on a hierarchical model of evidence. Dentomaxillofac Radiol. 2015;44**(**1**)**:20140189.

12. Alamri HM, Sadrameli M, Alshalhoob MA, Sadrameli M, Alshehri MA. Applications of CBCT in dental practice: a review of the literature. Gen Dent. 2012 Sep-Oct;60**(**5**)**:390-400