

# Isolated Impacted Premolar Disimpaction using Miniscrew

Komal Meena<sup>1</sup>, Amit Dahiya<sup>2</sup>, Arun Kumar<sup>3</sup>, Pardeep Singh<sup>4</sup>,  
Gurkeerat Singh<sup>5</sup>, Dayashankar<sup>6</sup>

<sup>1</sup>Associate Professor (MDS), Dental Department, Adesh Medical College and Hospital Mohri 136135 Ambala (Haryana) India

<sup>2</sup>Reader (MDS), Department of Orthodontics and Dentofacial Orthopedics, Sudha Rustagi College of Dental Sciences and Research, Greater Faridabad – 121002, Haryana, India

<sup>3</sup>Associate Professor (MDS), Department of Pedodontics & Preventive Dentistry, Post Institute of Dental Sciences Rohtak-124001 (Haryana) India

<sup>4</sup>Ex-Post Graduate Student (MDS), Department of Prosthodontics, Post Institute of Dental Sciences Rohtak-124001 (Haryana) India

<sup>5</sup>Professor & Head (MDS), Department of Orthodontics and Dentofacial Orthopedics, Sudha Rustagi College of Dental Sciences and Research, Greater Faridabad – 121002, Haryana, India

<sup>6</sup>Senior Resident (MDS), Department of Dentistry, Patna Medical College & Hospital, Patna, Bihar, India

## Corresponding Author

Dr. Arun Kumar (MDS)

Department of Pedodontics & Preventive Dentistry Post Institute of Dental Sciences Rohtak-124001 (Haryana) India

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## ABSTRACT

The advancement of the field of dentistry arises with the introduction of miniscrews into the orthodontic and dentofacial orthopedics. The efficiency and effectiveness of treating complicated orthodontics cases have significantly improved with the introduction of miniscrews. The biomechanical considerations, especially relating to anchorage control have become less of a concern and side effects have been consequently minimized. This article describes the use of a single miniscrew to erupt an isolated impacted premolar to the occlusal level without the use of a full bonded appliance followed by prosthetic rehabilitation.

**Key words:** Impacted premolar, Miniscrew, Interdisciplinary approach.

**Running Title:** Isolated impacted premolar disimpaction.

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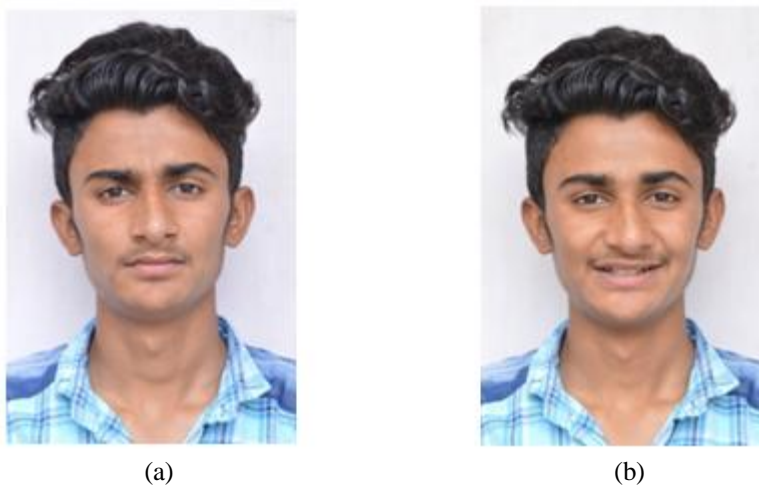
## INTRODUCTION

Treating impacted teeth can be challenging in orthodontics. Various treatment options have been advocated to bring impacted teeth into occlusion including Ballista spring<sup>1</sup>, Lingual holding arch<sup>2</sup>, K-9 spring<sup>3</sup>, Killroy spring<sup>4</sup> and miniscrews<sup>5-7</sup>. Many techniques have been described, all aiming at minimizing the side effects, which are frequently encountered within the anchor unit and on the adjacent teeth.<sup>2,3,5</sup> With the introduction of the miniscrews, it has become possible to reduce and avoid such biomechanical side effects while increasing efficiency and effectiveness of treatment.

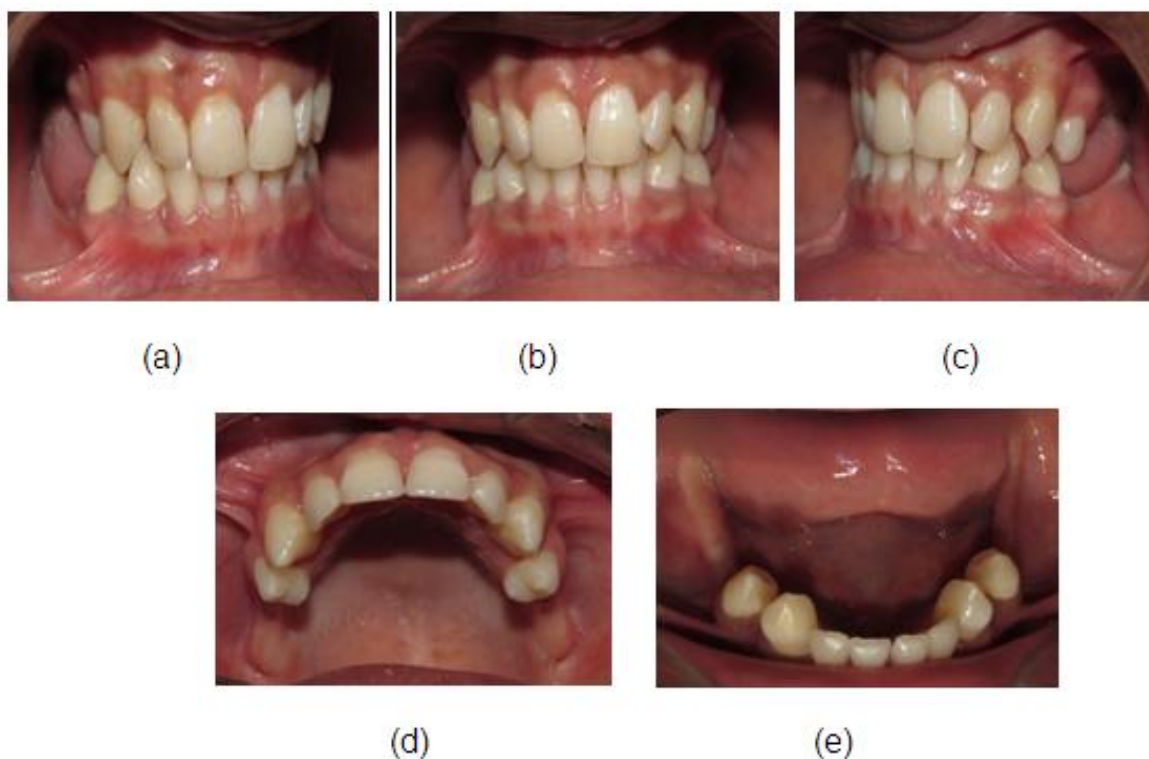
Orthodontic miniscrews come in a variety of shapes, diameters, and lengths. A major advantage of these screws is the ability of an orthodontist to place it himself. Failure of the miniscrew, however, is still a concern. In a review of miniscrew clinical trials, it was found that miniscrews have a success rate of 84%.<sup>7</sup> An increase in the success rate was found when screws with a diameter of at least 1.2 mm and a length of  $\geq 8$  mm were used.<sup>7</sup> This article describes the use of a single miniscrew to erupt an isolated impacted premolar to the occlusal level without the use of a full bonded appliance followed by prosthetic rehabilitation.

## CASE REPORT

A 16 year old male patient (Fig. 1 & 2) reported to Department of Prosthodontics for replacement of congenitally missing multiple posterior teeth.



**Figure 1: (a-b). Pre treatment extra-oral photographs**



**Figure 2: (a-e). Pre treatment intra-oral photographs**

On radiographic evaluation (Fig. 3) it was found that it was a case of partial anodontia with only 17 teeth present i.e., first pre-molar to first pre-molar in both the arches and an isolated impacted premolar in the third quadrant. On clinical examination it was found that the posterior edentulous ridge was so thin that prosthetic implants could not be placed and removable partial denture (RPD) was the only viable and economical option available for rehabilitation. The case was referred to the orthodontic department to erupt the isolated impacted premolar to facilitate the fabrication of a RPD.



**Figure 3: Pre-treatment OPG**

### Technique

The patient refused the use of a full bonded orthodontic appliance for the alignment of teeth. An innovative method was devised to erupt the impacted tooth. This included a single bracket head type of miniscrew inserted buccally in the maxillary ridge in the second quadrant (in the region of missing maxillary first molar). Simultaneously surgical exposure of the isolated impacted mandibular second premolar was undertaken and a bracket bonded on the crown (Fig. 4). A small segment of elastic chain was tied between the miniscrew and the bracket on the tooth (Fig. 5).



**Figure 4: During surgical exposure of the impacted premolar**



**Figure 5: (a-b). Impacted tooth tied to a miniscrew with the help of an elastomeric chain.**

The size of the elastomeric chain was selected in such a way that when stretched to 3 times its size corresponded to the maximum mouth opening. The patient was asked to do mouth opening exercises twice a day. The patient was asked to report to the department after every 2 weeks for changing of the elastomeric chain. After 5 months of treatment time the premolar had erupted in a rotated position to the occlusal level. It was impossible to de-rotate the premolar and this was explained to the patient. With the patient unrelenting, it was decided to fabricate a flexible maxillary and mandibular removable partial denture (Fig.6-8).





**Figure 6: Wax trial for the Removable partial denture after eruption of the impacted mandibular second premolar**



**Figure 7: Acrylic prosthesis on the casts.**



**Figure 8: Final prosthesis in the mouth**

Even though the results were not ideal, the technique used showcases the advantage of anchorage provided from the TAD inserted in the opposing arch and least amount of mechanotherapy involved.

## DISCUSSION

In the management of congenitally missing teeth, the radiographic position of the teeth, erupted as well as unerupted plays an essential role in the determination of the prognosis for treatment. In the case reported here would, therefore, be considered having a poor prognosis from every aspect. With the advent of miniscrews, however, the prognoses of such cases and others may have to be revisited.

Traditionally, treatment involves overcoming the biomechanical side effects on the anchor unit making treatment more difficult and prognosis more challenging. While miniscrews require their own biomechanical considerations, they are, in this case, far less complicated. Being able to position the miniscrew further distal and more gingival, has enabled the

pulling of the canine away from the lateral incisor to avoid root resorption. However, root resorption of the central incisor was noticed though unlikely from the mechanics itself. The use of a cone-beam computed tomography radiograph initially would have helped further with the diagnosis of the case before initiation of treatment.

In addition to the mechanical benefits, the use of the miniscrew as illustrated in this case report has enabled delaying bonding of teeth at a later stage. The risk for orthodontic side effects such as decalcification<sup>5</sup> caused by extended treatment time, can, therefore, be reduced. Hence, minimal cooperation is required from the patient during this initial stage of treatment.

Orthodontic miniscrews are used for anchorage in many different malocclusions. A major concern with their use, however, is the ability of the miniscrew to withstand the forces applied and to remain stable. The miniscrew used in this case report was able to withstand all forces and remain stable for the duration of force application. In a review authors<sup>7</sup> concluded that the most important factors for increased success of a miniscrew were the use of a diameter of greater than 1.2 mm and a length of 8 mm or more. Furthermore, the placement of the miniscrew in attached gingiva and at an angle of 45° to the occlusal plane has helped minimize side effects such as gingival inflammation and overgrowth and root damage<sup>6,7</sup>.

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