

# Orthodontic Treatment Complications in Concrescence: A Case Report

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## ABSTRACT

Concrescence is an abnormal union of adjacent teeth involving only the cemental tissues of the affected teeth. It has been previously reported in the region of maxillary molars, posing a hazard to their extraction. However there is no mention of it being seen in the region of maxillary anterior teeth of patients requiring orthodontic treatment. As a clinical diagnosis of concrescence is not possible, special radiographic techniques have to be employed. The following is an unusual case report of a patient in whom orthodontic treatment progress was delayed owing to the inability to detect the concrescent roots of maxillary right central and lateral incisors. CBCT helped in confirming the diagnosis and site of concrescence. Surgical separation of the roots allowed the orthodontic treatment to progress but resulted in severe root resorption in the concerned teeth. Since proper alignment of anterior teeth is essential to produce an esthetic outcome, concrescence, if present, can pose a grave potential hazard to orthodontic treatment.

**Keywords:** Concret roots, Incisors, Orthodontic treatment, Root resorption.

## INTRODUCTION

The term 'Concrescence' is derived from Latin word 'Concrescere', meaning 'to grow together' (Friel J, 1974, in Dorland's Illustrated Medical Dictionary and Woolf HB, 1973, in Webster's New Collegiate Dictionary).<sup>1,3,11</sup> A common working definition of concrescence describes the abnormality as a union of adjacent teeth involving only the cemental tissues of the affected teeth. (Gorlin RJ and Goldman HM 1970, Shafer WG, Hine MK and Levy BM 1974, Spouge JD 1973, Santangelo MV 1968, Stafne EC and Gibilisco JA 1975, Colby RA, Kerr DA and Robinson HB 1971, Zegarelli EV, Kutscher AH and Hyman GA 1969).<sup>1,4,6,7,9,10,12</sup>

Several authors (Shafer WG, Hine MK and Levy BM 1974, Santangelo MV 1968, Zegarelli EV, Kutscher AH and Hyman GA 1969)<sup>6,7,12</sup> say that the etiology of concrescence involves two basic elements:

1. The roots of adjacent teeth must somehow come into close approximation with one another.
2. Deposition of additional cementum on the closely approximated root surfaces must result in the union of the teeth through the confluence of their cemental tissues.

The number, size and location of the cemental attachment or attachments forming the union may vary considerably. In some instances, the involved teeth may be united by only one or small areas of cemental confluence. In other instances, the attachment may be so large that the affected teeth are united by a solid cemental mass along their entire approximating root surfaces (Mader CL, 1984).<sup>2</sup>

While concrescence most commonly involves two adjacent teeth, at least one reported case involved three adjacent teeth joined together only by their cemental tissues (Shafer WG, Hine MK and Levy BM 1974).<sup>7</sup> Concrescence usually involves the maxillary molars, especially the maxillary third molars. (Gorlin RJ and Goldman 1970, Spouge JD 1973).<sup>4,9</sup> Concrescence may occur before or after eruption of affected teeth. If it occurs before eruption, one or more of the affected teeth may remain unerupted (Shafer WG, Hine MK and Levy BM 1974, Santangelo MV 1968, Stafne EC and Gibilisco JA 1975).<sup>6,7,10</sup> No race, age or sex predilection is apparent for this odontogenic anomaly (Mader CL 1984).<sup>2</sup>

Clinically, concrescence is almost impossible to detect. Because the enamel is not involved in this condition, the

crowns of the affected teeth, if erupted, appear normal. The only clinical clue to alert the clinician that concrescence is present may be the finding that one or more adjacent teeth have not erupted (Mader CL 1984).<sup>2</sup>

Radiographically, concrescence also may present diagnostic problems. Even by using multiple projections, clinicians frequently are unable to distinguish between actual concrescence and teeth that simply overlap or are superimposed radiographically. The fact that normal amounts of cementum are not visible on radiographs further hinders diagnosis (Stafne EC and Gibilisco JA 1975).<sup>10</sup> Rather substantial deposition of additional cementum or fortuitous angulation of the radiograph [or both] would be necessary in most instances before the clinician would strongly suspect the existence of concrescence. Thus in most cases, the clinician is unable to establish a definite diagnosis based on radiographic evidence (Mader CL 1984).<sup>2</sup>

Histologically, concrescence appears as normal adjacent teeth enjoined only by their cemental tissues (Gorlin RJ and Goldman HM 1970, Spouge JD 1973).<sup>4,9</sup> The enamel and dentin of the affected teeth are normal and not involved in the union. Gorlin and Goldman (Gorlin RJ and Goldman HM 1970) suggested that serial sections are necessary to prove definitely that the reunion of teeth involves only cemental tissues. If other hard dental tissues also are involved in the union, then a diagnosis of Concrescence is prohibited by definition.

Although researchers agree that concrescence occurs after crowns of the affected teeth have been formed completely and that concrescence involves only the cemental tissues; some disagreement exists about exactly when the cemental union of the affected teeth takes place in relation to root formation (Mader CL 1984).<sup>2</sup>

Shafer, Hine and Levy (Shafer WG, Hine MK and Levy BM 1974)<sup>7</sup> say that “concrecence occurs after root formation has been completed.” Spouge (Spouge JD 1973)<sup>9</sup> claims that teeth in concrescence are “joined to each other after their crowns and a major part of their roots have been formed”. Gorlin and Goldman (Gorlin RJ and Goldman HM 1970)<sup>4</sup> state that concrescence “may form during development of the two teeth or after development is completed”.

The second etiologic factor contributing to development of concrescence, suggested by Sicher and Bhaskar,<sup>8</sup> (Orban BJ 1972) is the close approximation of the roots of adjacent teeth. They recognized that teeth having concrescent roots often develop in a crowded environment. Close approximation of the roots of adjacent teeth may result from simple crowding or as positions of the teeth constantly change during the eruptive process. The roots of incisor teeth also are in close

approximation and this occurs frequently owing to the limited alveolar space anywhere in the tooth bearing areas of the jaws.

Considering the above facts, concrescence may develop at any time during root formation, or after the completion of root formation, as long as the two basic elements; i.e. the deposition of additional cementum which results in confluence of cementum of adjacent teeth and secondly the proximity of the roots as in a crowded alveolar environment; are fulfilled. (Mader CL 1984).<sup>2</sup>

The following is an unusual Case Report of a patient in whom treatment progress was delayed on account of the complication of concrescent roots. It also describes the problems faced post-treatment.

## CASE REPORT

A 17-year-old girl reported to the Orthodontic clinic with the main objective of getting her protruded upper front teeth corrected. On clinical examination, it was observed that she had balanced facial proportions with potentially competent lips. However, the bidentoalveolar protrusion caused an appreciable strain on the lips and puckering of the chin when she tried to close her lips. Especially obvious was the exceptionally prominent upper right central incisor which seemed to be the only malaligned tooth in an otherwise straightforward case, posing a major impediment to lip seal. The profile revealed increased facial convexity due to dentoalveolar protrusion in the lower facial third (Fig. 1A).

Her smile was consonant with normal width of buccal corridors and the entire length of incisor crowns visible on full smile. There was no positive history of dental trauma, this in fact, was her first visit to a dental clinic. The main purpose of her visit was to get her teeth properly aligned with the help of braces (Fig. 1B).

Oral hygiene and periodontal condition were fairly good with adequate amount of attached gingiva to carry out regular fixed orthodontic therapy involving extraction of all first premolars, followed by alignment, leveling and retraction of anterior teeth for correction of the dentoalveolar protrusion.

The routine X-rays were taken to correlate the clinical appearance and findings. Attention was drawn to the radiographic position of upper right central incisor owing to its unusual axial inclination, but nothing amiss was suspected at this stage (Fig. 1C).

The case was considered to be a routine one with bimaxillary protrusion for which all first premolar extractions were done followed by bonding of the preadjusted .018 slot MBT prescription fixed appliance, the initial wires being upper



**Figure 1A** Extraoral photos: Right profile view, frontal smiling and frontal at repose



**Figure 1B** Intraoral photos: Right lateral, frontal, left lateral, upper occlusal and lower occlusal

and lower .014 NiTi with canine lacebacks to allow alignment of anterior teeth.

When the patient returned after 5 weeks, it was a bit disappointing to note that there had been no improvement, whatsoever, in the position of upper right central incisor, which was the chief tooth to be derotated in the upper arch.

The same wires were religated but the patient returned again after another five weeks without change in position of 11. The next step involved checking the incisors individually for mobility and this particular incisor (i.e. 11) displayed definitely decreased degree of mobility compared with other incisors. Not losing heart and reassuring the patient, stronger wires were inserted in both the arches. The situation failed to

improve over the next few months even with NiTi rectangular wires of dimension .016 × .022 inches and .016 AJ Wilcock wires inserted (Fig. 2A) with the hope that if there was some point of ankylosis of 11 to the surrounding alveolar bone, it might break free under the influence of heavy orthodontic forces being applied by stainless steel wires.

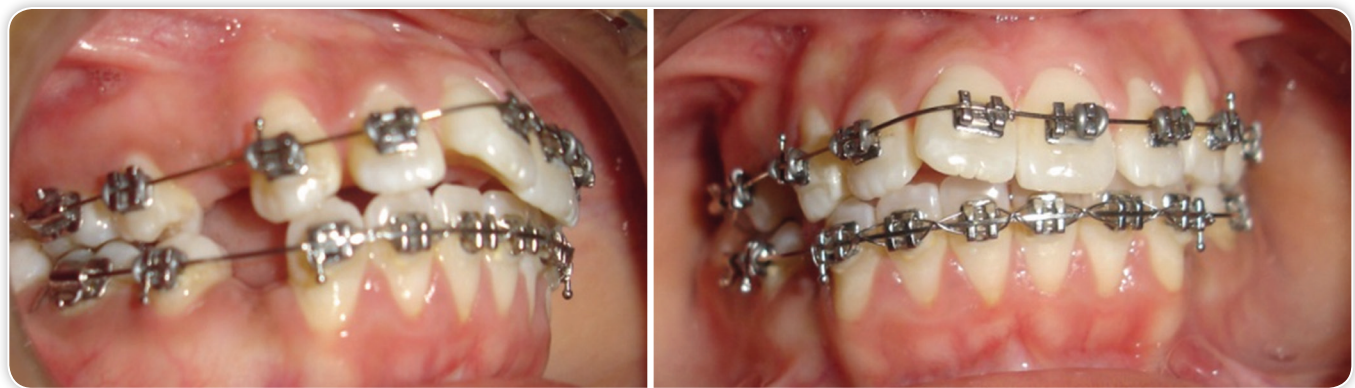
Examination of the lingual surfaces of upper incisors indicated that the patient was not brushing those surfaces well enough, although on questioning she admitted of only occasional instances of mild pain in all four upper incisors generally but not in 11 or 12 specifically (Fig. 2B).

The grave situation, at that point, definitely warranted some further investigation into the failure of being able to derotate





**Figure 1C** Pretreatment radiographs: Lateral cephalogram and OPG X-ray



**Figure 2A** Eight months into treatment showed no derotation of upper right central incisor

the upper right central incisor. Digital IOPA X-rays to view the root of the concerned incisor did reveal a blurring of the apical thirds of the distal aspect of 11 and mesial aspect of 12 (Fig. 2C).

It was at this stage that the possibility of the roots of 11 and 12 being strongly fused, despite their being fully erupted, became evident. We contemplated to separately retract the maxillary canines on both the sides of the upper arch and if the right maxillary lateral incisor also drifted distally, owing to the pull of transeptal fibers, it would negate our suspicion of the roots of the two upper right incisors being fused. On undertaking this, there was still no distal movement or space appearing between the crowns of 11 and 12. The patient was sent to get a CBCT view of the maxillary teeth which ultimately confirmed the suspicion of fusion of the fully erupted and completely formed roots of the right sided maxillary central and lateral incisors in the apical third region (Figs 3A to E).

It was decided to separate the Concrescent roots surgically with the assumption that the fusion was cemental in nature



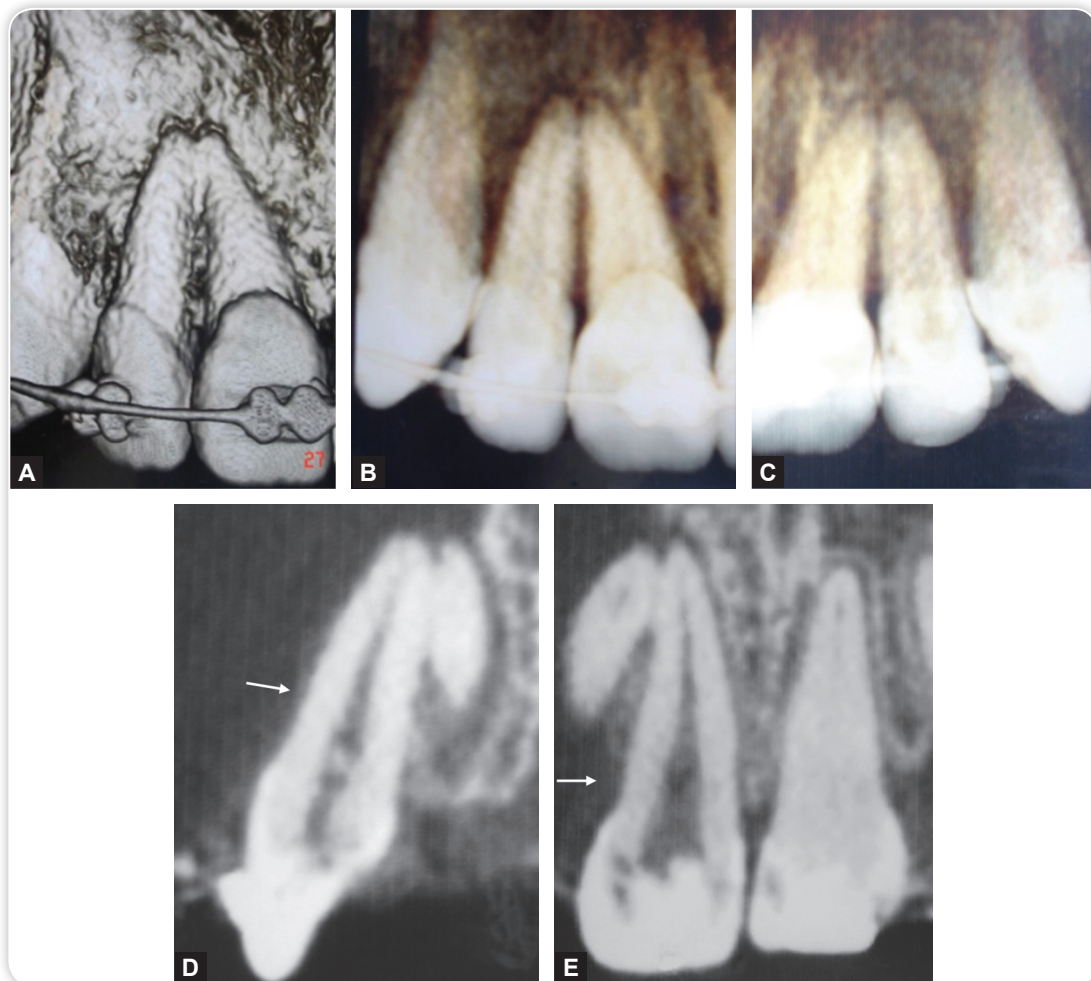
**Figure 2B** Patient unable to clean the lingual surfaces of upper incisors due to pain on brushing

and localized to only a small area of the apical third of the two teeth. A mucoperiosteal flap was raised and a surgical



**Figure 2C** Digital IOPA taken to closely view root apices of 11 and 21 when 11 failed to derotate after 6 months of treatment

Piezo instrument (Piezotome solo by Acteon-Satelec, surgical tip used LC-1) was used to give a vertical cut, interdentially, extending from the labial cortical plate, cutting through the cemental union between the two incisor teeth, towards the lingual cortex; in the apical third region. In order to confirm the disunion of the teeth, the surgical instrument was placed between the surgically disconnected teeth, to ensure the complete separation of the proximal root surfaces of maxillary right central incisor and its adjacent right lateral incisor, in their apical one third. An IOPA radiograph was recorded with the Piezo held in this position. The flap was sutured into position and even at this stage, i.e., immediately on having broken the cemental union, some degree of derotation of the maxillary central incisor was clearly evident as an instant response. Also on raising the flap significant bony dehiscence was observed



**Figures 3A to E** (A) 3D labial view, (B) CBCT labial view, (C) CBCT palatal view, (D) CBCT, sagittal slice, (E) CBCT coronal slice showing concrecence in apical third of incisor roots



on the labial aspect of both the incisors indicating that their roots would have to be torqued palatally to acquire adequate bony support. An upper .016 stainless steel wire was ligated at the same appointment, keeping in mind the RAP phenomenon that follows any kind of surgical injury to periosteum in the vicinity of teeth being moved orthodontically. Removal of sutures a week later was followed by placement of U/L .016  $\times$  .022 SS wires (Figs 4A to C).

While in the upper arch separate canine retraction with NiTi coil springs was continued, the lower anterior teeth were retracted enmasse. Once maxillary canines were fully distalized, the maxillary incisors were also retracted on .017  $\times$  .025 SS wire, although at a slower rate than usual, allowing for their dehiscent roots to be torqued palatally into cancellous bone, followed by their bodily translation (Fig. 5).

A radiograph taken 15 months following surgery showed signs of significant resorption (Fig. 6) in the once concrescent roots.

Hence, it was decided to relieve these teeth of orthodontic forces as early as possible to arrest the root resorption and prevent it from progressing further. As there was neither any crown discoloration in 11 or 12, nor increased mobility, and since the patient was absolutely asymptomatic, it was decided to postpone endodontic treatment of 11 and 12 until further evaluation. The occlusion was hurriedly settled on light wires with a circumferential supracrestal fibrotomy being done for 11 to prevent rotational relapse on account of transeptal fibers. The case was debonded soon (Fig. 7) and bonded retainers were given for upper central incisors and the lower anterior teeth.

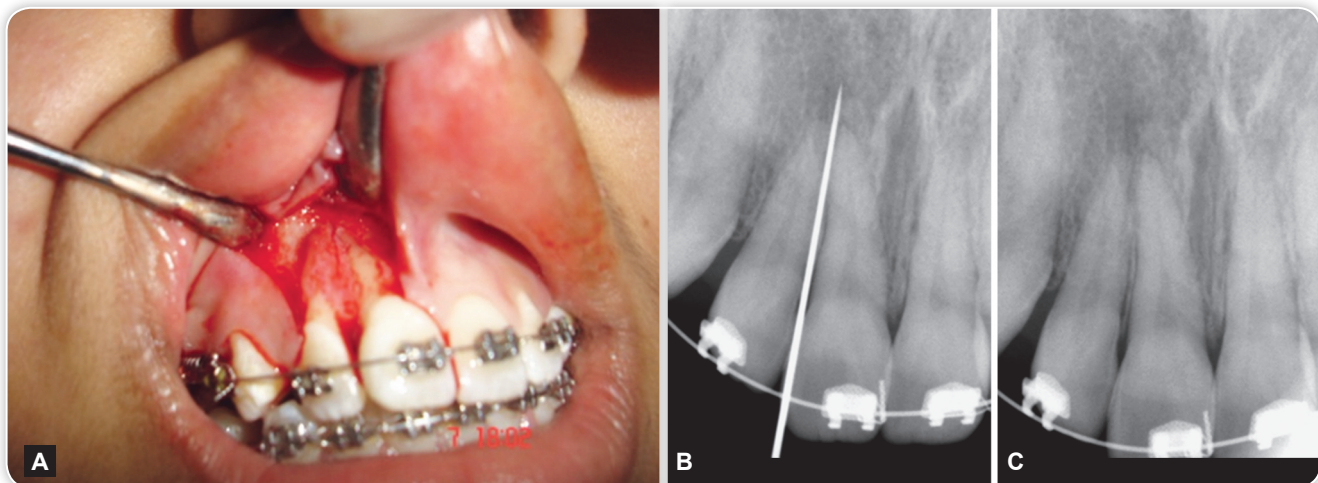
An upper removable Hawley's appliance was also part of the retention phase. The option of clear retainer for the upper arch was offered which the patient declined.

The patient was recalled for follow up at 3 months, 6 months and 12 months later and radiographs were taken to observe the status of root resorption. While it could not be affirmed that active resorption had stopped, there was an indication of new bone formation in the previously radiolucent periradicular region (Figs 8 and 9).

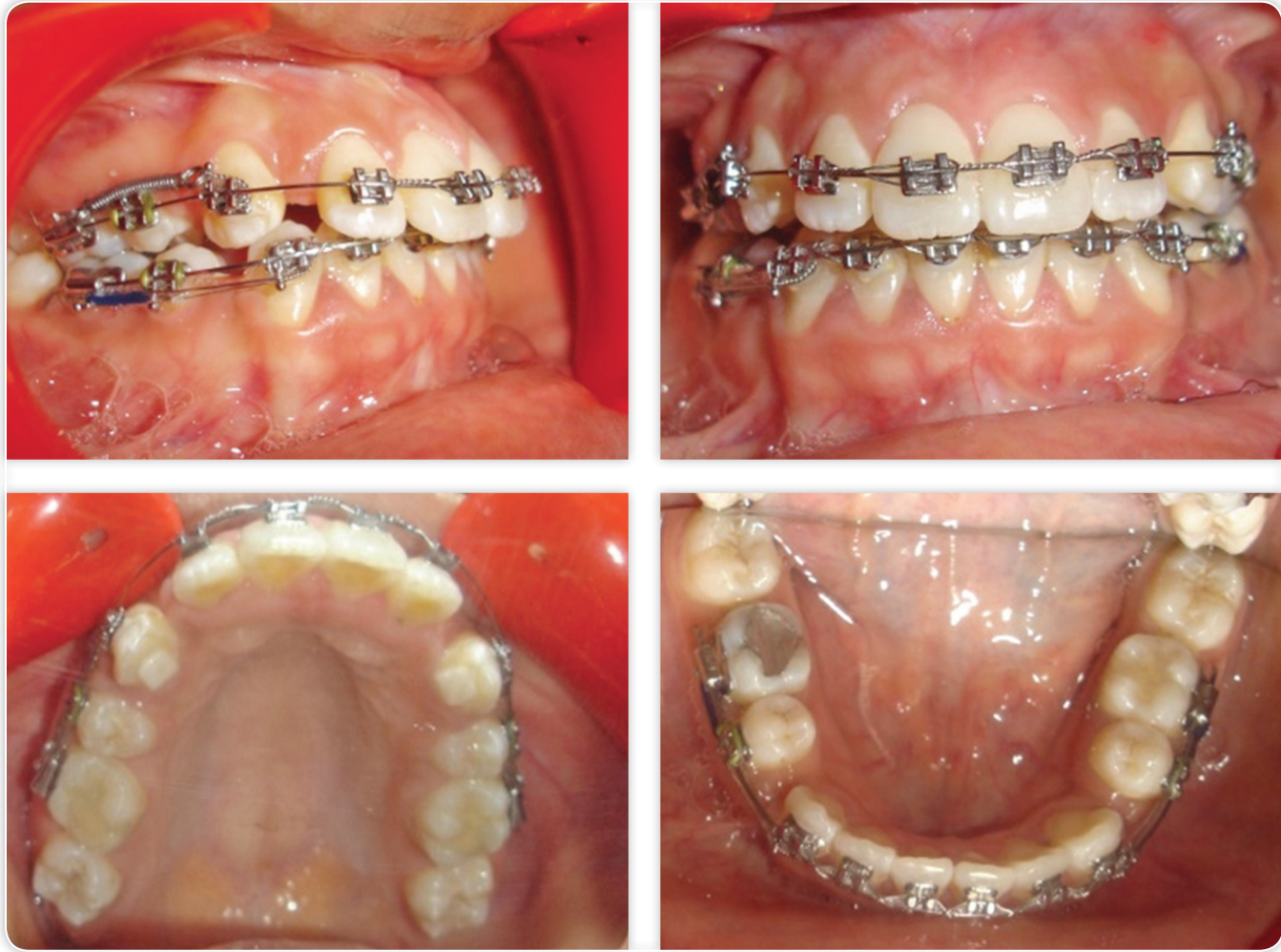
When the patient was recommended to undergo endodontic treatment in 11 and 12 to improve their long term prognosis, she expressed her willingness to remain under regular 3 monthly monitoring with radiographic evaluation to see if resorption of the roots of 11 and 12 progressed or subsided. The appreciable periapical bone formation seen, around the roots of the surgically separated concrescent roots of maxillary right central and lateral incisors, contributed to our optimism of keeping these teeth under observation for further root resorption before instituting endodontic therapy.

## DISCUSSION

Previous cited literature (Thoma KH, Gorlin RJ and Goldman HM 1970, Spouge JD 1973, Mader CL, 1984)<sup>2,4,9</sup> has given reports of concrescence mainly in the molar region with one or more teeth remaining unerupted; a phenomenon which remained mostly undetected and posed problems at the time of extraction. The above report is a rare instance of Concrescence occurring in the maxillary incisor teeth following their complete



**Figures 4A to C** (A) Flap raised to separate concrescent roots surgically, (B) Radiograph with Piezo inserted to confirm the separation of roots, (C) Radiograph taken after separating roots of 12 and 11



**Figure 5** Intraoral photographs taken 6 months postsurgery showing canine retraction in maxillary arch and lower arch ready for enmasse anterior retraction



**Figure 6** Significant root resorption seen in roots of 12 and 11

eruption. Till date, there is no explicit orthodontic literature available that can serve as a reference for the detection and proper management of concrescent roots of malposed incisor teeth. Clinically, it not only poses a challenge in diagnosis, but also proves to be a potential hazard to orthodontic tooth movement and is a matter of great concern since the optimum position of incisors is paramount for pleasing smile esthetics. Furthermore, it is a phenomenon that can be easily missed on routine radiographic investigations as crowded teeth commonly show overlapping or close proximity of roots on an OPG X-ray. CBCT is undoubtedly the investigation of choice to confirm concrescence of roots in such situations.

When malaligned teeth fail to respond to correction on application of orthodontic force, their roots should be observed carefully and among other causes the possibility of concrescence should be looked into.





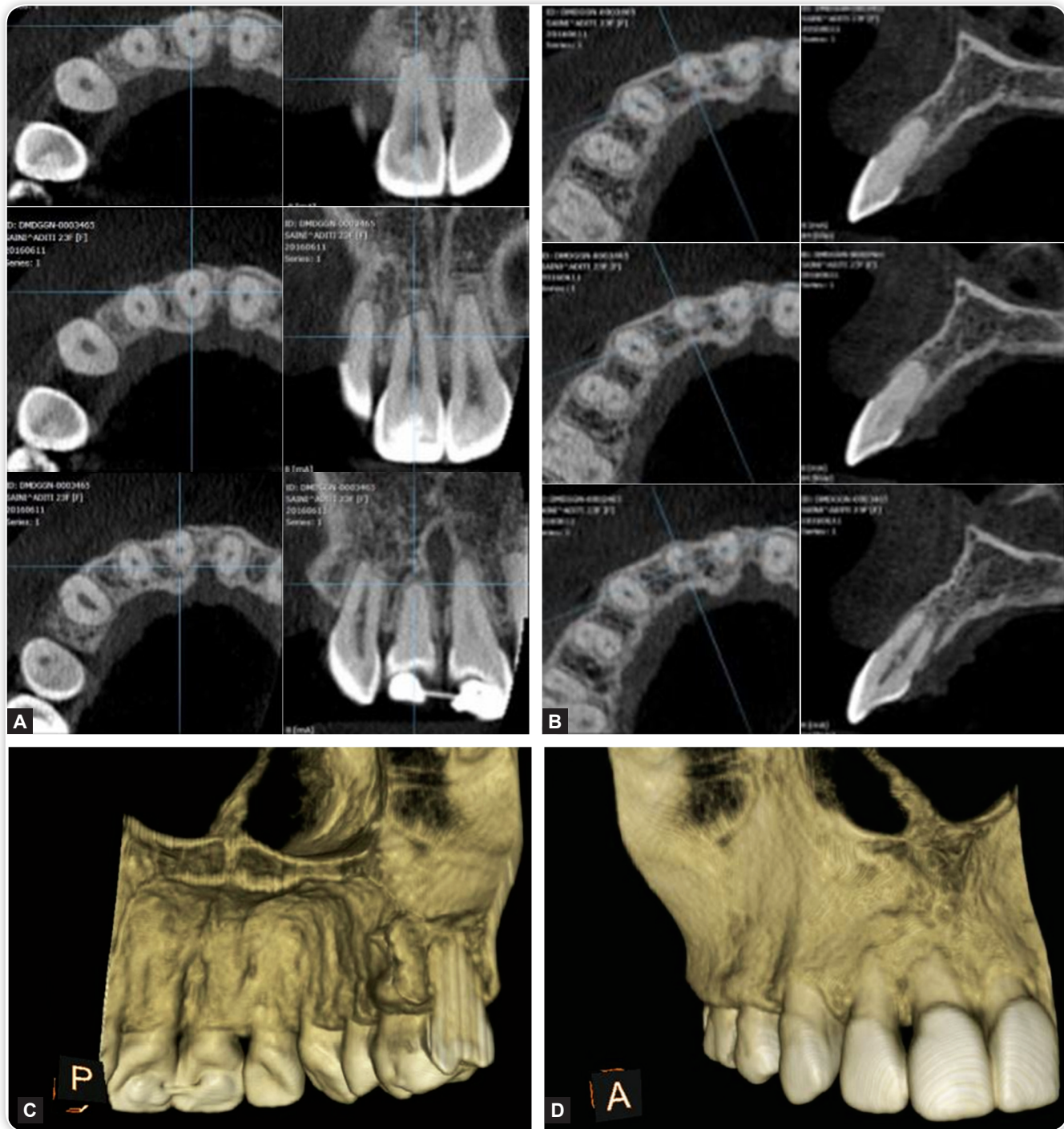
**Figure 7** Extraoral and intraoral photos post debonding



**Figure 8** IOPA taken 3 months post debonding to observe root status and periapical region

The decision of not doing endodontic treatment of the involved teeth, prior to the surgical separation of their roots, was based on the premise that the surgical procedure would involve only the lateral aspect of the roots and be limited to the cementum. However, the considerable root resorption that occurred later left us in doubt regarding this decision. On the other hand, absence of any crown discoloration or periapical radiolucency in relation to 11 and 12, supported the fact that pulp remained vital. Pulp vitality tests were also done to confirm the same. The periapical region became progressively radiodense over twelve months, following debonding, leading us to believe that the resorptive process of bone as well as roots had been arrested. Of the total resorption seen, major part had occurred during the initial 3 months of piezocision. Subsequent radiographic examinations showed increasing radiodensity in the apical periradicular region around 11 and 21, while root





**Figures 9A to D** Post debonding CBCT images: (A) MPR 11, (B) MPR 12, (C) 3D palatal view, (D) 3D Labial view

shape and length appeared to remain unchanged from 6 months to 1 year after debonding. The patient was informed of the need of periodic evaluation and requirement of endodontic treatment of 11 and 21 in future.

Unfortunately, there was no available literature (when this case was properly diagnosed) that outlined the sequence

of management of patients having concrescent teeth and reporting for orthodontic treatment. It may be a wiser decision to treat these teeth endodontically before separating their roots surgically as it has been seen that EARR is slower in endodontically treated teeth when compared to teeth with vital pulps (Lee YJ and Lee TY 2016).<sup>5</sup>

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