Case Report

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Management of Class II Div 2 Malocclusion with Congenitally Missing Premolar and Impacted Mandibular Canine- A Case Report.

Abstract :
Treatment ofClass II div 2 malocclusion has always been a challenge for an orthodontist which requires a careful diagnosis and a treatment planning including occlusal, functional, and esthetic considerations. Additionally, the presence of impacted mandibular canine increases the complexity of the treatment as more clinical efforts and time is required to dis-impact mandibular canine, as mandible has a dense cortical bone. This case report represents the management of a class II div 2 malocclusion with impacted mandibular canine treated with camouflage in a 14 years old patient. The impacted canine was orthodontically guided into occlusion and a good esthetic and functional results were achieved.

Key words: Class II div 2 malocclusion; impacted mandibular canine; two maxillary premolar extraction; boot loop; protraction utility arch.

Introduction:

Treatment of Class II div 2 malocclusion in adults requires careful diagnosis and a treatment planning including occlusal, functional, and esthetic considerations..An orthodontist has limited treatment alternatives for such patients and usually treat them with growth modification and surgery. The fixed functional appliances are given for simultaneous correction of maxillo-mandibular complex. Although, camouflage with extraction of premolars is also an option, but it gives uncertainty to facial esthetic.

It has been seen that outcomes of surgical mandibular advancements are similar to that achieved with camouflage treatment. In Class II div 2 patients with mild-to-moderate skeletal discrepancies, dental compensation may be the best choice of treatment which includes flaring of lower anterior, and extraction of premolars.

Difficulty increases when class II div 2 malocclusion is associated with impacted mandibular canine. More clinical efforts and time are required to dis-impact mandibular canine, as mandible has dense cortical bone.

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The following case report represents the management of a class II div 2 malocclusion with impacted mandibular canine treated with camouflage in a 14 years old patient.

Case report:

A 14 years old male patient reported to us with the chief complaint of backward and irregularly placed anterior teeth in both the arches.

He exhibited brachycephalic and mesoprosopic form with no gross facial asymmetry. He had a convex profile, decreased clinical FMA with decreased lower anterior facial height, an acute nasolabial angle and 1mm inter-labial gap (Fig 1).

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Intraoral examination revealed a bilateral class II molar relation associated with a reduced overjet and 100% overbite due to excessive palatal inclination of upper central incisors accompanied with supra-eruption of lower incisors. Retained deciduous teeth were also present in respect to upper left deciduous second molar, and lower left deciduous canine. Moreover, missing upper left second premolar and a lower left canine were also noticed, which may represent impacted teeth. By doing an inspection and palpation of the above sites, a bulge on lingual surface of lower left jaw was sensed. Mild to moderate crowding was visualized in both the arches (Fig 1).

Lateral cephalometric analysis showed skeletal class II jaw bases (ANB=4°) with increased interincisal angle (160°). Lower incisors were also retroclined (Table 1, IMPA=84°). Panoramic radiograph revealed normal temporomandibular joint and normal crest of interdental alveolar bone. The retained second deciduous molar (65) was intact and retained lower left deciduous canine (73) was severely resorbed. Upper left second premolar (25) was congenitally missing. Lower left permanent canine (33) was impacted with crown at the level of cervical line of the adjacent teeth making it a "level A" impaction. Upper right third molar was also missing, and the remaining third molars were in early stages of development (Fig 1).

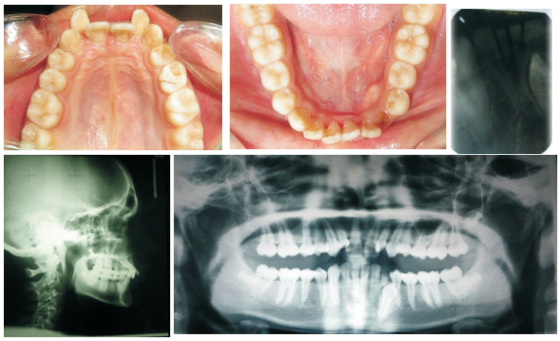

Figure 1. Pretreatment photographs, models and radiographs of the patient.

Parameters	Normal value	Pre treatment	Post treatment
SNA	82°	86°	84°
SNB	80°	82°	81°
ANB	2°	4°	3°
Wits (mm) (AO ahead of BO)	-1 mm	-2 mm	0 mm
Facial axis	90°	97°	96°
FMA	25°	15°	15°
Upper incisor to SN	102°	95.5°	120°
N perpendicular A (mm)	0 to1mm	-2 mm	-4 mm
N perpendicular Pog (mm)	-4 to 0mm	-3 mm	-3 mm
Molar to PTV (mm)	-	15 mm	15 mm
U1 to NA	22°	9°	29°
U1 to NA (mm)	4 mm	1.5 mm	3 mm
L1 to NB	25°	8°	31°
L1 to NB (mm)	4 mm	-1 mm	3 mm
IMPA	90°	84°	102°
Interincisal angle	135°	160°	114°
Nasolabial angle	102°	86°	90°
Mentolabial sulcus (mm)	5 mm	8 mm	5.5 mm
Upper lip protrusion (mm)	1 mm	3 mm	0 mm
Lower lip protrusion (mm)	1mm	1.5 mm	0 mm
H angle	11.5°	25.5°	14°
E line to upper lip	-	0mm	-1mm

Table 1: pretreatment and post treatment lateral cephalometric readings.

Considering his clinical and radiographic findings, He was diagnosed with convex facial profile, a class II skeletal pattern, and Class II div 2 malocclusion. Deep bite due to supra eruption of lower incisors and severe retroclination of upper central. Lower left canine was vertically as well as lingually impacted.

Treatment objectives:

Principal treatment objectives were

- Leveling and aligning of both arches,
- Creating space for impacted tooth and facilitate its eruption,
- Achieving ideal over jet and overbite,
- Leveling excessive curve of spee,
- Maintaining class II molar relation.

Treatment alternatives:

Three treatment options were suggested to the patient.
First was facilitating eruption of canine and alignment of both the arches followed by distalization of maxillary molars to achieve class I molar relation and anatomical modification of retained second deciduous molar as its roots were intact. This option was also discarded, as the cephalometric analysis showed posterior positioning of the upper molar (upper molar to Ptv-15mm).

Second option included jumping the bite with the help of fixed functional appliance and facilitate the eruption of impacted canine. This option was discarded as the patient wasn't satisfied with the digital VTO. Moreover, as the patient already had a well-formed chin, further advancement would have created a negative facial result.

Third option was facilitating eruption of canine followed by 2 unit extraction that is, upper right first premolar and upper left deciduous second molar, and finishing the malocclusion in class II molar and class I canine relation.

After explaining about these options, patient opted for third treatment alternative since he was not ready for any invasive line of treatment.

Treatment progress:

Treatment was initiated by extraction of upper right first premolar, upper left deciduous second molar, and root stump of retained lower left deciduous canine. A fixed preadjusted appliance with MBT prescription (0.022″ × 0.028″ slot) was first bonded on upper arch, leveling and aligning was achieved in 8 months using sequential arch wires starting with 0.012″ NiTi, 0.014″ NiTi, 0.016″ SS., 0.016×0.022″ NiTi and 0.017×0.025″SS.arch wires. Lastly 0.019×0.025″SS arch wire was placed into brackets slot and retraction of upper anterior segment was started through friction mechanics by using elastomeric chains for 4 months. Once the alignment of the upper arch was achieved, bonding of lower arch was done and similar archwire sequence was applied. A protraction utility arch was given for 3 months, fabricated on a 0.017×0.025″ TMA arch wire for correction of lower incisor inclination, spee and to gain space for dis-impaction of impacted mandibular left canine (Fig 2).

Figure 2. Photographs showing retraction of upper anteriors on 0.019×0.025″SS, and protraction utility arch in lower jaw made-up of 0.017×0.025″TMA

After 13 months of active treatment, impacted canine (33) was surgically exposed via open technique, bonded with a begg's bracket and a Monkeyloop(fabricated on 0.009″ ligature wire) anchored on a piggy back 0.012″ NiTi wire. An open coil spring was given in lower left canine region on 0.017×0.025″SS arch wire to gain extra space for the canine. At this point, patient missed his two consecutive appointments which led to excess opening of space in the canine region. After complete eruption of the canine, MBT bracket of lower left second premolar was switched over to the lower left canine to provide more of negative root torque (Fig 3). It took 7 months for complete alignment of mandibular impacted canine into the arch. All excessive spaces were closed using elastomeric chain on 0.019×0.025″SS arch wire.

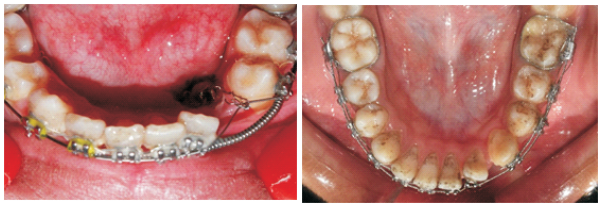

Figure 3. Disimpaction and leveling of impacted canine (33).

Differential boot loop on 0.019×0.025″ TMA arch wire was given in upper arch with αbend=10º, β bend=20º on left side and α bend=20º, β bend=10º on right side for simultaneous retraction and protraction of respected side (Fig 4). A total of 4 mm activation of loop was done in two months. Finally, minor adjustments were made and patient was left for settling phase

for 3 months on 0.014 ″ NiTi arch wires. Triangular elastics on right side and short class II elastic on left side was given (Fig 5).

Figure 4. Boot loop on 0.019×0.025″ TMA with α =20º, β=10º on right side for protraction of posterior segment and α =10º, β=20º on left side for retraction of anterior segment.

Figure 5. Settling of the occlusion.

The total treatment duration was 29 months. A full time wear essix retainers were given for 12 months in both the arches for retention.

Treatment result:

Patient was greatly satisfied with an improved facial balance and charming smile along with well aligned dental arches. Ideal overjet and overbite were established, and molar relation was maintained. A Class I canine relation was achieved with a harmony of dental midline. Good intercuspation was achieved (Fig 6).

Panoramic radiograph showed good root parallelism except for the root of lower right first premolar, which was tipped towards the adjacent canine. Amid COVID-19 pandemic lockdown, patient reported after 4 months and was not ready for the tooth uprighting as it would take further 2-3 months. Mild root resorption was noted on the upper central incisors (Fig 6). Cephalogram displayed correction of upper central incisors (upper incisor to SN= 120°) with ideal torque, and overcorrection of lower incisors (IMPA= 102°). Soft tissue profile was remarkable enhanced (Table 1). Superimposition of pre and post lateral cephalogram was coinciding with our treatment results (Fig 7).

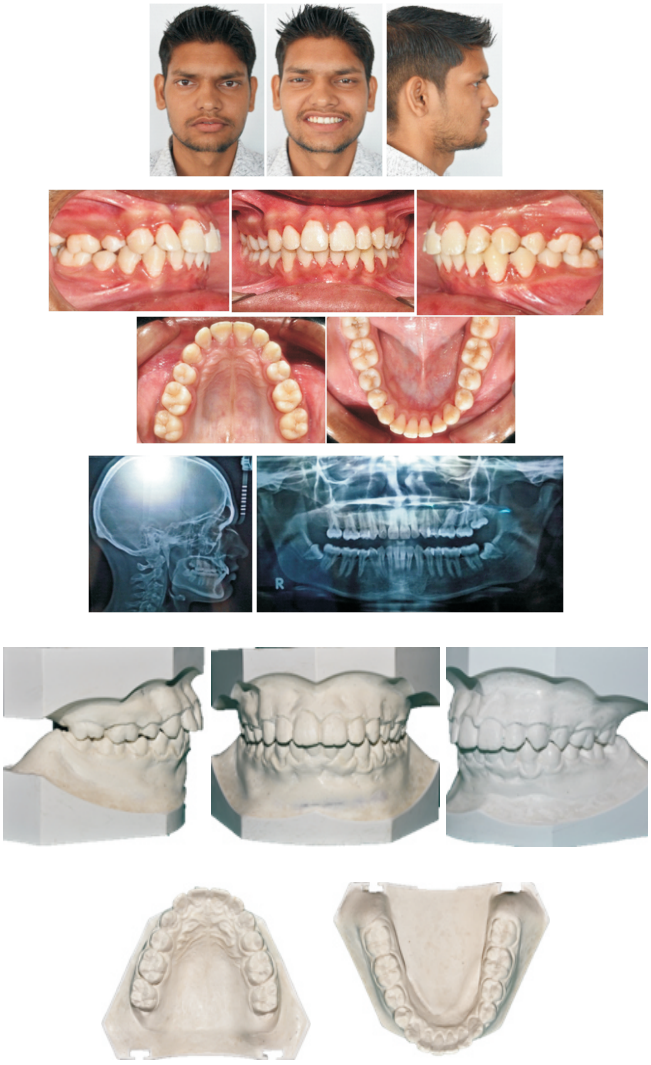

Figure 6. Post treatment intraoral and extraoral photographs along with post treatment radiograph.

Figure 7. Superimposition of pre-treatment (black) and post-treatment (red) lateral cephalogram.

Patient was also advised for both crown built up for upper lateral incisors, gingivectomy for crown lengthening and extraction of third molars. Treatment results were stable after 6 months of debonding as evident in the follow up records (Fig 8).

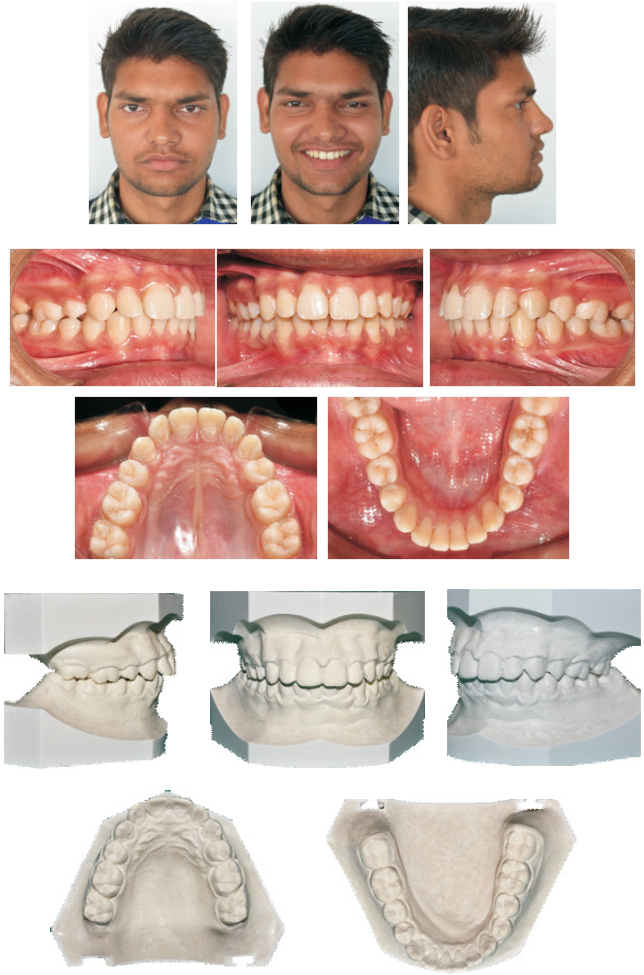

Figure 8. follow up (6 months).

Discussion:

Treatment of class II div 2 malocclusion still remains a debatable topic. Most clinicians suggest that the class II div 2 malocclusion can be best treated with nonextraction approach to avoid retraction of the anteriors, as the mentalis and orbicularis oris muscles are often well developed and active. The facial profile of patient remains a critical parameter to be considered in the extraction decision. Patients with class II div 2 malocclusion usually have prominent nose and chin with retrusive lips. The lingual tipping of maxillary incisors may emphasize the presence of the lower lip curl in association with vertical over closure. The combination of the decreased facial height and hyperactive mentalis muscle accentuates the chin prominence. In such case, extraction of teeth for retraction of anterior dentition and lip will further deteriorate the soft tissue profile and would worsen the profile. The overall effect of the treatment will result in an undesirable "dish in profile" or "edentulous look".

In current case report, the patient was well managed with extraction line of treatment. The decision of extraction was based on ample amount of crowding along with overlapping of maxillary lateral incisor over retroclined central incisor. The deepbite was resolved with flaring of maxillary incisors. Although, it was hard to maintain the soft tissue profile, the end result was satisfying. Lip harmony and balance was improved along with nasolabial angle, and mentolabial sulcus (Table 1).

Moreover, the combined effect of retroclined maxillary incisor and supraeruption of mandibular incisor results in abnormal mandibular path of closure and habitual occlusion. The condyles get displaced in more posterior-superior position and the mandible is forced into a more retruded position. In such cases, the correction of maxillary incisor inclination would allow the mandible to move in a forward direction, but this is not observed in current case.

In this present case, permanent canine was placed vertically and obstructed by deciduous canine. The mandibular canine impaction is an unusual event with a prevalence rate of 0.05–0.4%, and more often caused by mechanical obstruction, insufficient space and tooth-arch size discrepancy. Moreover, mandibular bone density is very high, especially around the anterior region, hence, greater forces, time, and more anchorage are required to move an impacted canine. Furthermore, we applied a simple mechanics using NiTi piggy back wire to disimpact the "level A" canine which delivers light force, and gives effective control.

Summary and conclusion:

In summary, the decision of extraction purely lies on the proper diagnosis. Clinician should evaluate multiple factors involving facial profile, functional mandibular retrustion, the prominence of chin and nose, and the amount of crowding.

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