CASE REPORT

Miniscrew implants. An effective means of absolute anchorage

Akhilesh Belcnandan[1], Eshan Awasthi[1], Ankur Jain[1], Shruti Hatewar[1]

[1]MDS, Private Practitioner, Raipur, Chhattisgarh, India

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ABSTRACT

Bimaxillary dentoalveolar protrusion is the condition characterized by procumbency of lips due to increased protrusion of maxillary and mandibular incisors. This condition can be due to tooth size arch length discrepancy, weak lip musculature unable to withstand strong tongue pressure. This results in severe labial tipping of incisors, which causes upper and lower lip protrusion. This case report describes the treatment of a 21-year old girl with bimaxillary protrusion and convex profile with incompetent lip seal. The treatment of choice for the patient was extraction of four first premolars and utilization of extraction space to reduce the facial convexity by retraction of anterior teeth. The anchorage requirement was maximum for complete correction of facial profile. Mini implants were used to retract the anterior teeth and improve facial aesthetic. Treatment was completed in 20 months. Patient`s facial profile improved significantly with reduced dental protrusion and lip eversion.

Keywords: Bimaxillary Protrusion, En mass retraction, Mini implant.

INTRODUCTION

Bimaxillary protrusion is a malocclusion commonly seen in Asian population [1]. The clinical picture which is presented is procumbent upper and lower lip due to proclined maxillary and mandibular anterior teeth. This result in lip incompetence, deep mentolabial sulcus, spacing with upper and lower anteriors [1].

The standard treatment protocol for such condition includes extraction of all four 1st premolars and utilization of extraction spaces for reducing convexity of facial profile and correction of proclination. In this case, maximum anchorage of the posterior teeth is of utmost importance for complete retraction of anterior teeth and correcting the profile [2]. Mini-implants prove to be a very effective means of skeletal anchorage with reduced patient compliance and predictable treatment outcome [3].

The current case discusses about a 21-year old female patient with bimaxillary protrusion corrected by extraction of maxillary and mandibular first premolar and using mini implant in maxillary and mandibular arch.

CASE REPORT

A 21 year-old girl reported to the orthodontic clinic with the chief complaint of procumbent upper and lower lips.

Extraoral examination: The patient had mesoprosopic facial form, convex profile, and incompetent lip seal with deep mentolabial sulcus. (Figure 1)

Fig 1: Pre-treatment intra-oral

Intraoral examination: revealed all teeth in upper & lower arch present till 2nd molar. U shaped upper & lower arch. Class I molar & canine relationship bilaterally, mandibular crowding (2mm), 3mm of overjet, 3mm of overbite. (Figure.2)

Fig 2: Pre-treatment intra-oral

Cephalometric analysis: showed a Class I skeletal pattern (ANB= 1^0) with vertical growth pattern (mandibular plane angle 34^0). (Figure 6) (Table1)

Table 1: Cephalometric analysis data

	Parameter	pre-treatment	Post treatment
SKELETAL	SNA	820	810
	SNB	810	800
	ANB	10	10
	FMA	320	320
	GONIAL ANGLE	1340	1350
	GO GN SN	340	350
DENTAL	U1-NA	390	210
	UI-NA	15mm	4mm
	UI-SN	1210	1000
	L1-NB	360	220
	L1-NB	11mm	5mm
	IMPA	980	910
SOFT TISSUE	E LINE-U	4mm	-2mm
	E LINE-L	7mm	0mm
	Nasolabial angle	850	930

DIAGNOSIS

- Skeletal Class I malocclusion with vertical growth pattern.
- Dentoalveolar Angle`s Class I, Dewey`s type 1 & 2

TREATMENT OBJECTIVE AND PLANNING

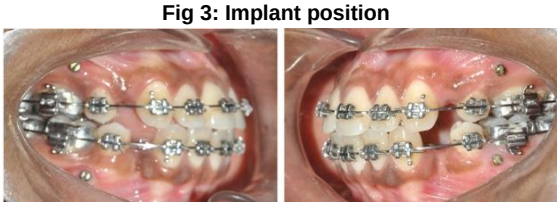
- To reduce convexity of profile
- To correct incompetent lip seal by reducing procumbency of lip
- To correct upper, lower proclination

Based on clinical and cephalometric examination, treatment plan was decided to extract maxillary and mandibular first premolar and reinforce posterior anchorage with mini screw implants.

TREATMENT PROGRESS

After extraction of first premolars, pre-adjusted edgewise appliance (MBT 0.022 slot) was bonded in upper and lower arch. Initial leveling and alignment was done using heat activated Niti wires with sequence 0.014 in, 0.016 in, 0.016 x 0.022 in, 0.017 x 0.025 in. This was followed by proceeding to 0.017x0.025”SS, 0.019x0.025”Niti, 0.019x0.025”SS. After leveling and alignment, four orthodontic mini-implants self-drilling type, conical shape with 1.5 mm diameter and 8 mm length were implanted into the buccal alveolar bone between the maxillary and mandibular first molars and second bicuspids. (Figure 3) The vertical position of mini implant (placed approximately 6mm from the orthodontic wires) was planned to achieve intrusive retraction force vector for torque control. A 0.019x0.025” SS arch-wire with mild RCS and 8 mm anterior hooks mesial to canine was placed in maxillary and mandibular arch and Ni–Ti close coil spring was used for retraction.

Fig 3: Implant position



After space closure finishing was done using 0.021x0.025” TMA archwire. Post debonding fixed lingual bonded retainer in both maxillary and mandibular arch from second premolar to second premolar was placed.

Total treatment duration was 20 months.

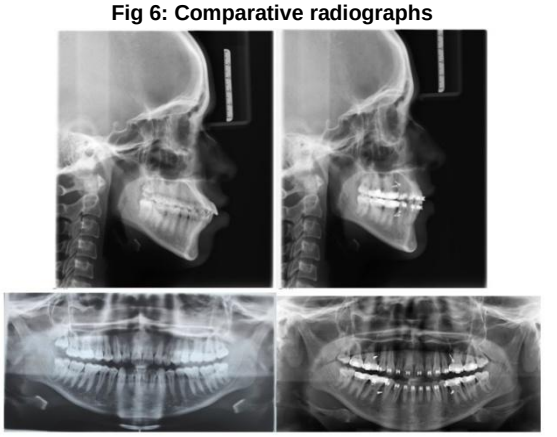
TREATMENT RESULT

Facial profile improved
Reduction in procumbency of upper and lower lips
Ideal overjet and overbite achieved

Fig 4: Post-treatment extra-oral

Fig 5: Post-treatment intra-oral

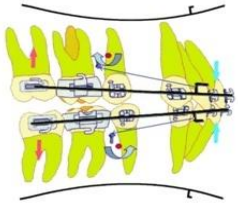
Fig 6: Comparative radiographs



Pre treatment radiographs | Post treatment radiographs

Fig 7: Cephalometric superimposition

Fig 8: Simultaneous rotation of both arches during anterior retraction with mini implants resulting posterior open bite



The final superimposition revealed the maxillary anterior teeth were bodily retracted (6 mm). The mandibular anterior teeth were retracted (4 mm) with uprighting (IMPA 91^0) (Figure 7) The upper and lower lips were retracted by 2 mm and 6 mm, respectively in relation to the E-line, and nasolabial angle had increased (from 85^0 pre-treatment to 93^0 post-treatment). (Figure 4, 5)

DISCUSSION

Facial aesthetics is an important consideration in orthodontic treatment and it is a well known fact in orthodontics that extraction reduces facial convexity [4].

Passive lace-back was used in initial phase of treatment. Bending the archwire immediately distal to the last banded molar teeth minimizes the forward tipping of the incisors [4-6]. Earlier elastic forces were used to connect anterior and posterior segments to control this flaring effect but this resulted in bite deepening famously known as roller-coaster effect [7]. The elastics were therefore replaced with 0.010" SS ligatures from the posterior segment to the cuspids called lace-backs. This resulted in prevention of proclination of canine and uprighting it.

According to Kocadereli when reduction in lip procumbency is desirable, extracting 1^{st} premolars is a viable option [8].

The mini-screws and mini-plates have been recent advances in the utilizing bone anchorage by taking sites such as interdental area between posterior teeth, retromolar pad, hard palate, maxillary tuberosity etc. For en masse retraction of anterior teeth interdental area between posterior teeth is considered best site both for the operator and the patient [9].

Growth pattern of this patient was hypedivergent. Anchorage control in hyper divergent growth pattern is difficult due to weak facial musculature. To augment anchorage various appliances such as a transpalatal arch, nance holding arch, extra oral traction and mini implant are used. Renfroe stated that, for a stable anchorage unit, it must be more resistant than the teeth being moved [10].

In implant supported retraction, because the force used during retraction is not reciprocal, posteriorly it is negated by miniscrew and not by teeth. As a result, the anterior segment rotates around the centre of resistance, producing posterior open bite and anterior deep overbite. (Figure 8) The use of pre-curved archwire results in reciprocal extrusive force on posterior segment to maintain posterior contact [11].

According to an FEM study done by Shrinivas the optimal position of retraction hook was found to be 8mm for bodily movement of anterior teeth [12]. Consideration has been made in placing the implant high to allow for simultaneous intrusion and retraction.

CONCLUSION

Mini-implants as an anchorage unit proved to be a viable option in reducing proclination, improvement of profile along with reduction of procumbency of lips, lip strain.

Mini-implants proved to be an effective mean of absolute anchorage by maintaining Class I molar relationship.

The patient compliance required was minimal which adds to its advantage over other conventional means of anchorage.

REFERENCES

1. Lewis, S.J., Bimaxillary Protrusion. The Angle orthodontist, 1943. 13(3): p. 51-59.
2. Al-Kabab, F., N. Ghoname, and S. Banabilh, Proposed regression equations for prediction of the size of unerupted permanent canines and premolars in Yemeni sample. Journal of orthodontic science, 2014. 3(3): p. 68.
3. De Araújo, T.M., et al., Tooth intrusion using mini-implants. ORTHODONTICS, 2008.
4. Lew, K., Profile changes following orthodontic treatment of bimaxillary protrusion in adults with the Begg appliance. The European Journal of Orthodontics, 1989. 11(4): p. 375-381.
5. McLaughlin, R. and J. Bennett, The transition from standard edgewise to preadjusted appliance systems. Journal of clinical orthodontics: JCO, 1989. 23(3): p. 142.

6. McLaughlin, R. and J.C. Bennett, Anchorage control during leveling and aligning with a preadjusted appliance system. Journal of clinical orthodontics: JCO, 1991. 25(11): p. 687-696.
7. Rajesh, M., M. Kishore, and K.S. Shetty, Comparison of anchorage loss following initial leveling and aligning using ROTH and MBT Prescription–A clinical prospective study. Journal of international oral health: JIOH, 2014. 6(2): p. 16.
8. Kocadereli, İ., Changes in soft tissue profile after orthodontic treatment with and without extractions. American Journal of Orthodontics and Dentofacial Orthopedics, 2002. 122(1): p. 67-72.
9. Aljhani, A. and K.H. Zawawi, The use of mini-implants in en masse retraction for the treatment of bimaxillary dentoalveolar protrusion. The Saudi dental journal, 2010. 22(1): p. 35-39.
10. Renfroe, E.W., The factor of stabilization in anchorage. American journal of orthodontics, 1956. 42(12): p. 883-897.
11. Vibhute, P.J., Optimizing anterior en masse retraction with miniscrew anchorage. Case reports in dentistry, 2011.
12. Ashekar, S.S., et al., Evaluation of Optimal Implant Positions and Height of Retraction Hook for Intrusive and Bodily Movement of Anterior Teeth in Sliding Mechanics: A FEM Study. Journal of Indian Orthodontic Society, 2013. 47

Corresponding Author:

Dr Eshan Awasthi
MDS
Private Practitioner
Raipur, Chhattisgarh.
Email: eshaan.awasthi33@gmail.com

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