# Implant as an anchorage – A perfect descendent of Darwin (Survival of The Fittest) - A Case report

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**Abstract**

**Background:** Treating a skeletal Class II malocclusion in non- growing patient has always been a controversial subject in orthodontics, whether to go for a surgical line of treatment or a conservative approach (camouflage). Treatment choices available are particularly difficult for young patients because of the uncertainty regarding future growth of mandible. Surgical treatment has generally been considered necessary for elderly patients with severe skeletal Class II problems. Temporary anchorage devices (TADs) have expanded the capabilities of clinicians, and allowed the correction of borderline orthognathic surgical cases to be treated with an orthodontics-only approach. This had greatly reduced psychological, economical burden on the patient and helped clinicians to achieve good functional and esthetic results as compared to surgical intervention. This case report discusses the management of one such skeletal Class II malocclusion using temporary anchorage devices (TADs).

**Results:** Post treatment records (Figure-5) shows optimum functional occlusion with a Class I canine and Class I molar relation bilaterally and a competent lip due to reduced lip strain. Smile arc (facial esthetics) of the patient has been greatly enhanced, owing to appropriate bracket positioning and reduced lip strain (Figure 7). Gingival recession irt 31 had improved, as previously there was thin labial cortical plate irt 31, with due course of retraction and maintenance of good oral hygiene.

**Conclusions:** Temporary anchorage device (TADs) is a boon for an orthodontist, but a thorough clinical knowledge is mandatory for proper placement and use of mini implants. A through clinical diagnosis and treatment planning is pre-requisite of any orthodontic procedure including Temporary anchorage devices (TADs). This has offered a wide variety of treatment alternatives, mainly while treating borderline surgical cases. Correcting only dental malocclusion should not be the only goal of treating resident, for good clinical results patients smile assessment and soft tissue analysis should be done and every effort should be made to correct or rectify the underlying problem.

**Key words**: Temporary anchorage devices (TADs), Skeletal Class II malocclusion, Camouflage, Extraction, Lip strain, MBT metal brackets, Smile design.

## Introduction

In 1962, Thomas S. Kuhn, an American physicist and epistemologist, in his text book on 'sociology of scientific knowledge,' titled 'The Structure of Scientific Revolutions,' wrote that every single scientific field experiences a periodic, non-linear, revolutionary accrual of information, referred to as 'paradigm shifts'[1-2]. A temporary anchorage device (TADs) is one of such revolutionary tool to orthodontics that portrays the Kuhn's philosophy of 'Paradigm shift/revolutionary phase' depending on evidence-based practice of TADs. The first clinical report of implant anchorage was in 1969 by Dr. Leonard Linkow[3]. The ability to treat adult patients conventionally indicated for surgery by TADs or TADs supported appliance or assemblies has expanded the envelope of discrepancy given by Proffit, W.R. and Ackerman[4].

Force applied through Temporary anchorage devices (TADs) passes through the center of resistance of dentition and parallel to the occlusal plane, so is better controlled and predictable, making treatment convenient for orthodontist and overcomes the drawback of conventional mechanics like anchorage loss, torque loss, etc.

## Case report

Present case report is about a 19 year old female patient, who came to the Department of Orthodontics with a chief complaint of forwardly placed upper front tooth (Figure-1).

**Table 1 (Reading of patient's lateral cephalogram tracing)**

| Measurements | Norm | Pre-Treatment | Post – Treatment |
|---|---|---|---|
| SNA (angle) | $82^0$ | $84^0$ | $81^0$ |
| SNB (angle) | $80^0$ | $79^0$ | $78^0$ |
| ANB (angle) | $2^0$ | $6^0$ | $3^0$ |
| U I to N-A(mm) | 4 mm | 7 mm | 4 mm |
| UI to N-A (angle) | $22^0$ | $27^0$ | $24^0$ |
| L I to N-B (mm) | 4 mm | 6 mm | 4 mm |
| L I to N-B (angle) | $25^0$ | $30^0$ | $26^0$ |
| U I to LI (Interincisal-angle) | $131^0$ | $117^0$ | $128^0$ |
| MPA | $32^0$ | $33^0$ | $31^0$ |
| IMPA | $90^0$ | $100^0$ | $94^0$ |
| Lip strain | Equal to upper lip thickness | 3mm | Equal to upper lip thickness |

**History**
Patient doesn't give any relevant medical and dental history.

**Diagnosis**
Extra oral examination reveals patient had euryprosopic facial form, brachycephalic head shape, incompetent lips, and convex facial profile with posterior facial divergence (Figure-1).

**Figure 1- Pre treatment records**

On intra oral examination, bilateral Class I canine and Class I molar relation with an overjet of 5 mm and overbite of 3 mm was observed. Proclination irt upper and lower anteriors, rotation and crowding irt lower anteriors (Figure-1).
According to Bengue et al. V- type gingival recession irt 31 with fair prognosis.[5]


**Figure 2A – Gingiva recession irt 31 (V type)**

Recessions, according to the coverage prognosis: - According to Bengue et al (Figure -2).
1. U-type – poor prognosis
2. V-type – fair prognosis
3. I-type – good prognosis.

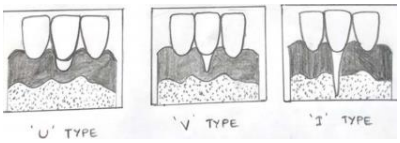


**Figure 2B- Gingival recession classification according to Bengue et al. (1983)**

**Functional examination**
This reveals an oro-nasal respiration, with 5 mm of incisor exposure at rest and 10 mm during smiling with 1 mm of gingival exposure.

**Model analysis**
Bolton's analysis shows an overall mandibular tooth size excess of 0.8 mm & mandibular anterior tooth size excess of 0.4 mm.

**Radiographic analysis**
Panaromic radiograph shows all permanent teeth were present and have optimum bone support for orthodontic mechanotherapy (Figure-1).
TMJ examination revealed normal size, shape and position of the condyle.
On cephalometric assessment, an ANB of $6^0$ shows skeletal Class II pattern and MPA of $33^0$ with
Hyper-divergent growth pattern (Table-1).
Other cepahlometric parameters such as 1/NA, 1/NB and IMPA were increased suggesting proclined upper and lower incisors with a lip strain of 3 mm.

**Treatment Goals:**
1. To obtain a good facial balance.
2. To obtain an optimal static and functional occlusion with the stability of the treatment results.

**Treatment Objectives:**
1. To level and align the teeth.
2. To achieve an ideal overjet and over bite.
3. To achieve an adequate functional occlusal, intercuspation with a Class I canine and Class I molar relation bilaterally.
4. To achieve lip competency.

**Treatment Plan:**
1. Bilateral sagittal spilt osteotomy with dental decompensation (15,25 and 34,44 extraction)
2. Symmetrical extraction of 14,24,34,44 for dental camouflage.

Patient and her parents were not willing for any surgical line of treatment so symmetrical extraction of 14,24,34,44 was planned based on clinical and radiographic evaluation. After obtaining patient's consent, fixed orthodontic mechanotherapy was started. Figure 3 shows dental VTO (anticipated changes in maxillary and mandibular arch).

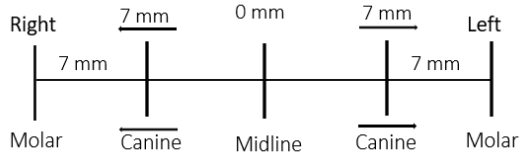


**Figure 3 - Dental VTO (anticipated changes in maxillary and mandibular arch)**

**Treatment progress:**

Following the extraction of upper and lower first premolars, fixed orthodontic mechanotherapy with a pre-adjusted edgewise appliance of 0.022"X0.028" slot (3M Unitek™) metal bracket prescription was initiated. An initial 0.014"and 0.012" round NiTi (3M Unitek™ Nitinol Super Elastic Wire) was used for the levelling and alignment of upper and lower arches respectively. At the end of 20 weeks, enough levelling and alignment was achieved. Gradually upper and lower 0.019" x 0.025" SS wire were reached.

En-mass retraction of the six upper and lower anterior teeth were carried out using TADs (Figure-4).

**Figure 4- U&L= 0.019" x 0.025" SS with Class I force from TADs**

A total of four mini implants were placed, two in maxillary arch and two in mandibular arches, of 1.5mm X 8mm dimension and 1.5mm X 6mm dimension (S K surgical, Pune) respectively. Mini implants were placed in between 2nd premolar and 1st molar, 5-6 mm from CEJ at an angle of $45^0$ from occlusal plane in both the arches.

Immediate loading was done through e chain from power arm of 8 mm length, so that force passes through the center of resistance of maxillary anterior dentition. In mandibular arch crimpable hook was used for force application.

Closure of extraction space was achieved within 10 weeks, following this 0.014" round NiTi wire (3M Unitek™ Nitinol Super Elastic Wire) was used for 12 weeks to settle the occlusion. Case was debonded and a fixed upper and lower lingual bonded retainers were given (Figure-5).

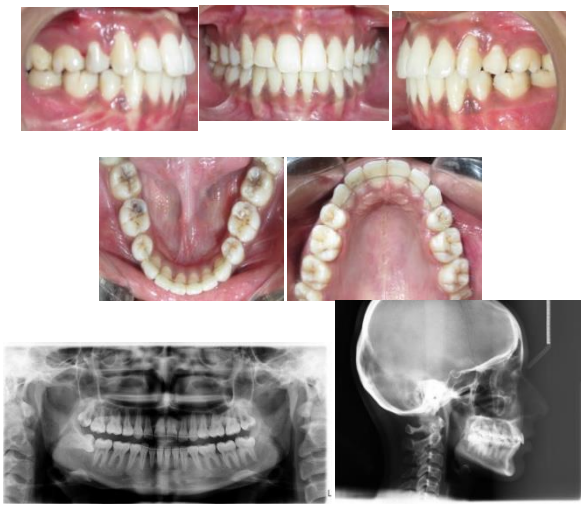

**Figure 5- Post treatment records**

**Treatment Result**

Post treatment records (Figure-5) shows optimum functional occlusion with a Class I canine and Class I molar relation bilaterally and a competent lip due to reduced lip strain. Smile arc (facial esthetics) of the patient has been greatly enhanced, owing to appropriate bracket positioning and reduced lip strain (Figure 7). Gingival recession irt 31 had improved, as previously there was thin labial cortical plate irt 31, with due course of retraction and maintenance of good oral hygiene. Treatment outcome was very much satisfactory for both patient and treating resident.

7A – Pre treatment

7B – Post treatment

**Figure 7- Smile Assessment**

**Discussion**

Temporary anchorage device (TADs) is a great tool to an orthodontist for applying a predictable and pre-determined force system. Figure-6 shows how forces and moments are produced following force application through Temporary anchorage devices (TADs). Insertion and removal of mini screws does not require any particular surgical procedure, in contrast with other means available such as orthodontic implants, mini plates, and onplants that require flap surgery so easily

placed and removed[6-7]. No need for any complicated clinical and laboratory procedures (i.e., fabrication of acrylic splints) to facilitate safe and precise implant insertion and can be loaded immediately thereby reducing the total treatment time. These mini screws are versatile in respect to their placement sites like palate, the palatal aspect of the maxillary alveolar process, the retro-molar area in the mandible, and the buccal cortical plate in both the maxilla and the mandible etc[8]. Mini-implant placement also depends on soft-tissue anatomy, inter-radicular distance, sinus morphology, nerve location, bucco-lingual bone depth, and buccal and lingual cortical thicknesses of bone, a systematic review showed that palatal implants have a better success rate compared to interradicular implants[9].

Temporary anchorage devices (TADs) eliminates the need of patient compliance[10] apart from maintaining good oral hygiene that is the pre- requisite of any orthodontic treatment. Forces applied are perpendicular to long axis of TADs, placing horizontal forces on the implants making them less prone to fracture[11].

At same time it has some of the disadvantages like damage of the adjacent tissues or root injuries due to improper insertion, irritation or inflammation of peri-implant tissues and consequent failure of the miniscrew implant[12]. Previous reports suggest greater moment arms created by increased abutment head distance from the cortical plate reduces implant stability[13].

Smile designing had become an integral part of any orthodontic treatment due to changing concept from correcting only dental malocclusion to soft tissue consideration that affects the overall personality of the subject. This should be considered at the very start of diagnosis and treatment planning stage and should be re-evaluated throughout the treatment procedure. Bracket positioning plays a vital role in doing so, reducing total treatment time during finishing procedure. As in the following figure difference in smile can be appreciated.

## Conclusion

Temporary anchorage device (TADs) is a boon for an orthodontist, but a thorough clinical knowledge is mandatory for proper placement and use of mini implants. A through clinical diagnosis and treatment planning is pre-requisite of any orthodontic procedure including Temporary anchorage devices (TADs). This has offered a wide variety of treatment alternatives, mainly while treating borderline surgical cases. Correcting only dental malocclusion should not be the only goal of treating resident, for good clinical results patients smile assessment and soft tissue analysis should be done and every effort should be made to correct or rectify the underlying problem.

## Declaration of patient consent

Author certifies that all appropriate patient consent was obtained. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. Patient understand that his/her/their names and initials will not be published and due efforts will be made to conceal his/her/their identity, but anonymity can't be guaranteed.

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