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MOLAR DISTALISATION BY PALATAL IMPLANTS-A CASE REPORT

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ABSTRACT

Palatal implants have been used to establish stationary anchorage. The stability of a palatal implant for distalization of molars bodily and for anchorage maintenance was assessed. The implant was a stepped screw titanium (4.5 mm diameter x 8.5 mm length), and it was placed in the palatal region. A surgical template containing a metal drill housing was prepared. Angulation of the drill housing was controlled according to the radiologic tracing of the maxilla transferred to a plaster cast section in the paramedian plane. The implant was placed using a noninvasive technique and left transmucosally to facilitate the surgical procedure and to reduce the number of operations. The paramedian region was selected **(1)** to avoid the connective tissues of the palatine suture and **(2)** because it is considered to be a suitable host site for implant placement. After three months of healing, the implant was osseointegrated and orthodontic treatment was initiated. The results showed that the molars were distalized bodily at five months, and no anchorage loss was observed. At the end of the treatment, the smile was improved, and an ideal Class I molar and canine relationship, an ideal overbite, and an ideal overjet were all achieved. In conclusion, palatal implants can be used effectively for anchorage maintenance and in space-gaining procedures. Use of a three-dimensional surgical template eliminated implant placement errors, reduced chair time, minimized trauma to the tissues, and enhanced osseointegration. This method can be used effectively to achieve distalization of molars bodily without anchorage loss.

KEYWORDS: Palatal implant; Molar distalization; Anchorage; Osseointegration

INTRODUCTION

Class II malocclusion is one of the most difficult malocclusions to treat, and stationary anchorage is one of the main factors determining the success of the treatment. Conventional extraoral appliances are routinely used to establish maximum anchorage. However, many patients reject headgear wear because of social and esthetic concerns, and the success of this treatment solely depends on patient co-operation[1].In many cases, a lack of cooperation results in anchorage loss, and unsatisfactory treatment results[1-8].

In recent years, studies have been directed toward the use of osseointegrated implants as anchorage units[8–13]. Experimental biomechanical studies,[14,15] studies on animal models,[15–20] and clinical investigations [21–23] have shown that dental implants that were placed in the alveolar bone were resistant to the orthodontic force that was applied. However, patients who need orthodontic treatment generally have a complete dentition; thus, there are no available sites for implant placement. Thus, alternative anatomic sites are required, and some investigators have used the retromolar area [11,24] or palatal region [25–30] as alternative sites.

Use of palatal implants for orthodontic anchorage is a new area of research, and investigations on this subject are limited. The orientation of palatal implants, in contrast to conventional dental implant applications in the maxilla, is in a reverse inclination. This reverse angulation of the long axis of the implant can misguide the surgeon in implant positioning and create a certain difficulty during surgical placement. Recently, for precise and easy palatal implant placement, a new method was introduced[31]. In this case report, the stability of a palatal implant for molar distalization and anchorage maintenance is assessed.

Case Report

Vignesh, a 19-year old male diagnosed with Class II Division 1 malocclusion. He presented a pleasant straight profile, but when he smiled his maxillary canines appeared unpleasant (**Fig. 1A,1B and 1C**). His chief complaint was buccally positioned maxillary canines (**Fig. 2A to 2D**). He presented an end- on molar relationship on the right side

and a full Class II molar relationship on the left side (**Fig.2B and Fig. 2C**). He had 6 mm of crowding in the maxilla and 4 mm in the mandible, with posterior dental constriction on right side. Our treatment plan was palatal implant placement for anchorage and molar distalization to correct the Class II and to resolve the maxillary crowding. A palatal implant (4.5 mm diameter 8.5 mm length) was placed in the palatal region for orthodontic purposes.

Fig.1A

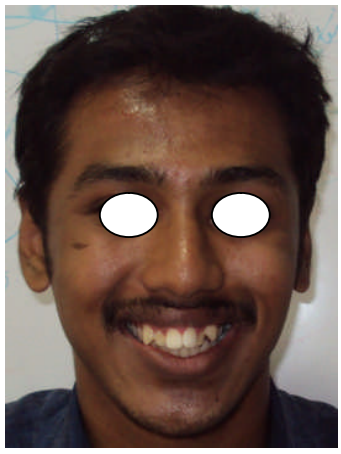

Fig.1B

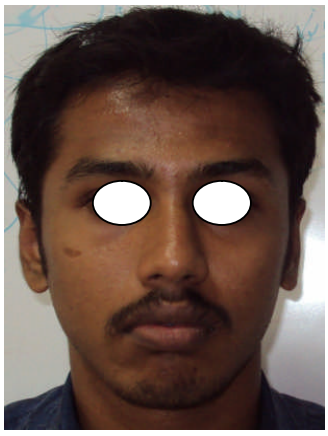

Fig.1.C

Fig. 1A -1C. Extraoral photographs of the patient

Appliance construction

For molar distalisation, the anchorage was obtained from the palatal implant. This modification in the design eliminated the support of the palatal soft tissues, first premolars, and anterior teeth. Maxillary first and second molars were banded, and on the palatal side of the molar bands, tubes of 0.045-inch diameter were welded. A stainless steel wire of 0.030-inch diameter (modified Transpalatal arch) was soldered to the molar bands bilaterally. Hooks were soldered towards the centre of the modified TPA. E- ties were attached from the hooks to the palatal implants for molar distalization. The amount of force generated was nearly 50 gm. This force system would allow application of consistent force at the level of the center of resistance of the first molars. The patient was seen once every month, and E-ties were replaced. After the distalization, the E-ties were removed. (**Fig.3A,3B, 3C, 3D and 3E**)

Results

After the three-month healing period, neither a peri-implant radiolucent layer on the cephalometric radiograph nor an implant mobility was detected. Thus, the implant was considered to be osseointegrated and was loaded with orthodontic forces. Orthodontic treatment results showed that the maxillary molars distalized by 3 mm on both sides after seven months of the cementation of the appliance (**Fig. 4A and Fig.4B)**. A super–Class I relationship was achieved on both sides, and the maxillary first and second premolars drifted distally. This allowed the crowded and ectopically positioned maxillary canines to align into a Class I relationship with the help of the transeptal fibers and distal drift. Molars were distalized in a bodily fashion **(Fig.4A and Fig.4B),** and there was no anchorage loss at the anterior segment with no upper incisor proclination or increase of the overjet **(Fig. 5A, 5B and 5C).** Three months before the end of the fixed orthodontic treatment, the palatal implant was easily removed by loosening the implant with the help of a hollow drill . The implant site healed rapidly within five days. One month later, there was no scar tissue on the palate, and the palatal cortical bone bridge appeared

At the end of the treatment, a pleasant profile was present, the smile was improved, and an ideal Class I molar and canine relationship, an ideal overbite, and an ideal overjet were all achieved. Extraoral and intraoral pictures of the patient at the end of the fixed orthodontic treatment are shown **(Fig. 3, Fig.4 and Fig. 5)**

Fig.2A

Fig.2B

Fig.2C

Fig.2D

Fig.2E

Fig2A-- Fig.2E. Intra Oral photographs –Pretreatment

Fig.3A

Fig.3B

Fig.3C

Fig.3D

Fig.3E

Fig.3A—Fig.3E. Appliance in place

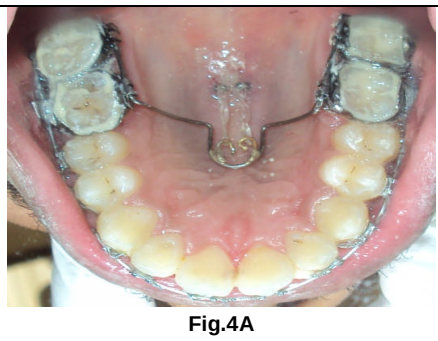

Fig.4A

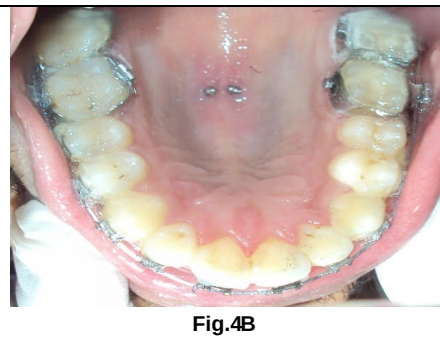

Fig.4B

Fig.4 A – Fig.4B. Postdistalization after 7 months

Discussion

The use of palatal implants has become an alternative mode of treatment in orthodontics over the last two decades[25–30]. The esthetic and social concerns of the use of headgear wear for molar distalization and the anchorage loss that occurs with the application of intraoral molar distalization mechanics stimulated many investigators to use palatal implants for anchorage. This treatment option can be criticized as necessitating surgery for a transient implant. But the benefits of this treatment, in comparison with those of the conventional treatment that uses headgear or intraoral appliances, are significant. The major advantage of using palatal implants is the preservation of the anchorage while moving the molars distally. This modification in the design also allowed distal drift of the first and second premolars with the help of the transeptal fibers while moving the molars distally. Our results showed that the implant was stable after the application of orthodontic forces, there was no anchorage loss in the anterior segment, and the molars were distalized bodily by 3 mm on both sides. In our patient, third molars extraction was recommended. When a minimally invasive placement technique that eliminates the incision, flap, and sutures is combined with a one-stage surgery, the surgical approach is simplified and well tolerated by patients. The patient's acceptance regarding surgical effects was positive, and postoperative pain and discomfort symptoms were negligible. Bernhatr et al[32] used the conventional surgical procedure Branemark for the placement of palatal implants. This conventional implant surgery requires a full thickness flap with considerable extension to view the operation field. For implant placement in alveolar bone, this requirement is helpful for detecting possible dehiscences or fenestrations around the implant and facilitates decisions concerning implant angulation and diameter. With palatal implants, the surgical procedure can be simplified by the elimination of the incision, flap raising, and sutures because the operating field in the palate is a quasiflat surface and there is no risk of creating defects in the bone around the implant. Thus, a punch drill can perforate the mucosa overlying the already decided implant site. This can decrease operation time, postoperative complications, edema, and pain. As the palatal mucosa is highly keratinized, peri-implant soft-tissue conditions are favorable, creating a firm connective tissue sealing. Thus, there is no risk in allowing the implant to heal transmucosally. Transmucosal palatal implants cannot be disturbed by chewing forces and are not preloaded because of their central localization. In the present study, the implant neck was not totally embedded into the cortical level but rather at the mucosal level to achieve one-stage advantages. The findings of another one-stage orthodontic implant system study also confirmed these results[29,30]. At the conclusion of the orthodontic treatment, surgical attempts can be made to cover the implant using punched mucosa or sliding flaps. In the present study, the implant was removed with a hollow drill and a reverse torque using extracting forceps, and the implant socket was left to heal without further treatment. Major difficulties in the treatment involved the nonconventional angulation that occurs during the positioning of the implant, which can misguide the surgeon. The reverse inclination of the impression posts from the pharyngeal direction makes a normally easy procedure a time-consuming step. Primary stability is a prerequisite in implant dentistry. In the present study, lateral angling of the implant was performed to avoid placement into the connective tissues of the palatine suture and to obtain more retention in the bone, as shown in the study of Bernhatr et al [32]. This lateral angling of the implant also facilitates viewing and handling of the handpiece. To eliminate mistakes in the radiologic evaluation of the pertinent anatomic structures, the use of a template is mandatory. Because of cephalometric radiograph magnification, metallic markers were used, and they served as a dimensional reference to assess the exact dimensions on the radiograph and to select the implant of correct size. The same template also can be used for treatment planning on the plaster cast and as a surgical template during surgery to facilitate preparation of the implant bed. In the preparation of the surgical

template, attention was paid to directing the drill housing from the palate toward the nasal spine.

CONCLUSION

A palatal implant was used for effective maintenance of anchorage and in space-gaining procedures in a patient. The molars translated distally without the loss of anchorage and tipping. No cooperation was required (no headgear), except good oral hygiene. Minimal invasive techniques eased the surgical procedure and reduced the operation time. The paramedian region could be a suitable implant site for orthodontic purposes. Transmucosal placement eliminates second-stage surgery. Use of a three-dimensional surgical template eliminated faulty implant placement and simplified intraoperative decisions concerning correct inclination of the long axis of the implant.

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