An easy way of chair-side stent fabrication for accurate placement of miniscrew implant

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Abstract

Implants have long been known as temporary anchorage devices serving the purpose of absolute anchorage to bring about effective tooth movement of dentoalveolar tissues. Many methods have been advocated for its precise placement including various designs for stent fabrication against which a proper site could be chosen for implant placement. This article provides an insight to a simplified way for chair-side fabrication of a stent that can help in reducing the risk of damage to adjacent dental roots, reducing the operator–patient time and improving the patient comfort and compliance.

Key words: Implants, miniscrew, skeletal anchorage, stent, temporary anchorage devices

INTRODUCTION

The latest titanium miniscrews are small enough that even anatomical regions with minimal bone quantity can be used as implant sites for skeletal anchorage.[1] The inter-radicular septum is one of the most commonly used locations when a complete dentition is present;[2] however, the risk of damage to adjacent dental roots and the maxillary sinus must always be considered.[3] Several authors[1,3] have developed surgical guides that are recorded on radiographs but they all require an extra appointment for laboratory fabrication, and none is widely available at present. This article describes a simplified stent that can be fabricated at the chair.

Stent fabrication

1. By overlapping an IOPA radiograph on the patient's working model, firstly, superimposition of the roots of the teeth, between which the implant is to be placed, should be done [Figures 1 and 2]. This helps in deciding the height of the placement of the miniscrew as well as in fabricating the height of the stent. This procedure is aided by keenly observing the bone density on the IOPA radiograph.
2. Intraorally, the observation of the final location of the stent is done between the roots of second premolar and mesiobuccal root of the first molar. Miniscrew insertion site is located by firmly pressing the long end of a periodontal probe against the buccal side of gingival tissue.
3. Stent fabrication was done accordingly with a 19'' × 25'' stainless steel wire [Figure 3]. A loop of 4 mm diameter was made, which was just double the diameter of the implant chosen and length of the two legs extending incisally was 6 mm. The total length of the stent was kept 9 mm (from the bracket position) such that the head of the stent should lie near the middle third of the roots of the second premolar and third molar. The two vertical legs should be divergent from each other and the horizontal component of the legs that is to be inserted inside the bracket and the molar tube should be at least 2 mm excess on both the sides. This is done to permit any adjustment in the stent while taking

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radiograph to locate the inter-radicular position.

4. Horizontally, the mesial leg of the stent is ligated into the second premolar bracket slot with elastomeric module (adjacent to the miniscrew placement site) and the distal leg is inserted into the molar tube [Figure 4]. The distal leg of the wire should extend by 2 to 3 mm from the distal end of the molar tube for free sliding of the stent within the molar tube and premolar bracket slot.
   Vertically, the stent should extend below the mucogingival junction (area with enough keratinized gingiva and bone density).
   For stent fabrication use of a rectangular 19'' × 25'' SS should be made instead of round wire. This will prevent the stent from free sliding within the slot and will allow it to firmly remain in place while making radiographic exposures.
5. A periapical radiograph is taken to confirm the proper positioning of the stent [Figure 5]. If necessary, slide the horizontal legs of the stent within the bracket slot such that the stent could be relocated to make a new radiographic exposure. This process is repeated until the loop of the stent lies accurately between the outlines of the roots in the proper bone density region.

Miniscrew insertion

1. Dry the mucosa with a cotton roll or a 2" × 2" gauze pad without moving the stent. Apply a topical anesthetic gel for 5 to 7 min.
2. Suction away the anesthetic, but do not dry the mucosa.
3. Test for adequate mucosal anesthesia by pressing the periodontal probe firmly against the tissue at the exact site of insertion. This soft-tissue 'punch' provides a visual marker and helps prevent slippage during self-drilling of the miniscrew.
4. The best visual access for miniscrew insertion is gained by sitting in the 12 O'clock position directly behind the patient, with the patient's head turned to the side. Make sure while inserting the miniscrew that the manual screwdriver is properly angulated [Figure 6].

This stent can also be used for placement of anterior inter-radicular miniscrews.

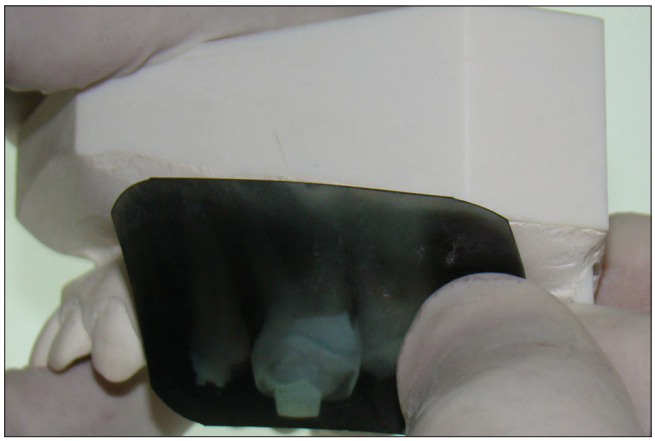

Figure 1: Observation of the extent of tooth roots by overlapping of the periapical radiograph on the working cast

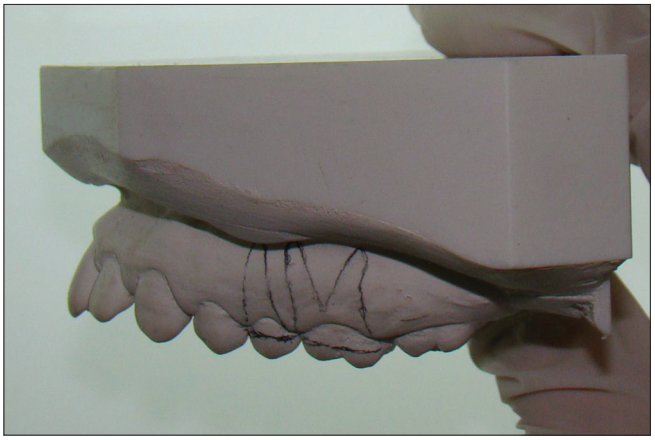

Figure 2: The roots of the second premolar and first molars drawn along with the bracket position

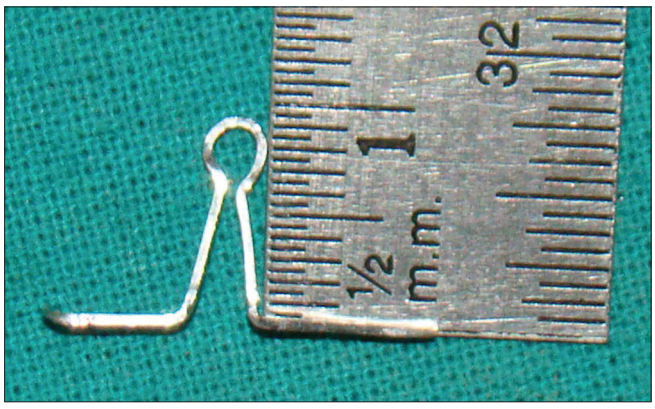

Figure 3: Stent fabrication was done with a 19'' × 25'' inch stainless steel wire

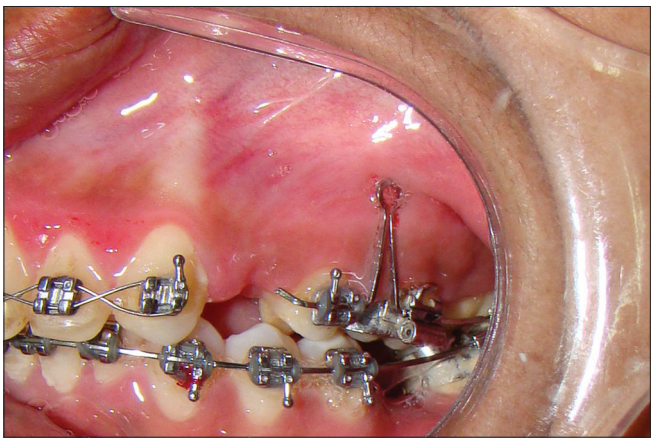

Figure 4: Stent in position in the oral cavity

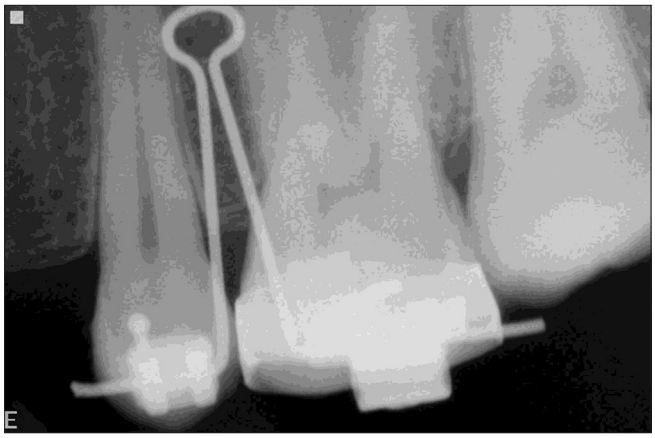

Figure 5: Periapical radiograph with stent in position

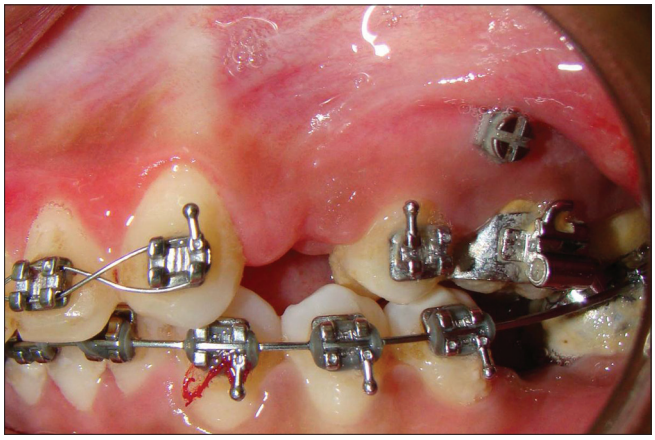

Figure 6: Miniscrew after insertion

Figure 7: Post implant placement periapical radiograph

Take a periapical radiograph even after insertion of the miniscrew to check the final position [Figure 7].

DISCUSSION

In recent years, mini-implants have added new horizons in clinical orthodontics. However, the success of miniscrew implant is mostly dependent on the placement accuracies in horizontal and vertical direction. To fulfill this goal, the article introduces a new innovation with this particular stent with divergent vertical arm and horizontal arms that can guide the clinician in choosing the right location with the abundant bone for the secure and safe implant placement. Vertical arm is of help in deciding the height of the implant placement in cases such as deep bite where the implant needs to be placed high. Other striking feature is the horizontal component of the legs that is to be inserted inside the bracket and the molar tube should be at least 2 mm excess on both the sides. This is done to permit any adjustment in the stent while taking radiograph to locate the inter-radicular position. The stent with a loop of 4 mm diameter that was just double the diameter of the implant allows easy placement and removal of the implant post insertion.

Stationary skeletal anchorage requires adequate cortical thickness and bone density. Bone of type D1 to D3 is optimal for self-drilling miniscrews. The maxillary posterior region is composed of type D2 bone with a thin cortical layer and thick trabeculae.[4]

Ideally, miniscrews should be inserted into thin, attached gingiva. The placement of miniscrews in the loose alveolar tissue increases the risk of peri-implantitis, soft-tissue overgrowth, and aphthous ulceration, raising the likelihood of miniscrew failure by 30%.[5] In the maxilla, superior placement may increase the risk of maxillary sinus perforation.

CONCLUSION

A simple chair side stent fabrication saves a lot of operator–patient time with precise placement of the implant reducing the risk of periodontal damage to the adjacent teeth and implant failure.

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