Short Communication

A Simple Guided Technique for Buccal Shelf Screw Placement

Ashwini Gundawar [1]; Sameer Parhad [2]; Vinay Umale [2]; Yash Goenka [2]; Samiksha Dabre [1];

[1] Postgraduate Student, Dept. of Orthodontics and Dentofacial Orthopaedics, Dr. Rajesh Ramdasji Kambe Dental College, Kanheri, Akola, Maharashtra, India.
[2] Dept. of Orthodontics and Dentofacial Orthopaedics, Dr. Rajesh Ramdasji Kambe Dental College, Kanheri, Akola, Maharashtra, India.

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ABSTRACT

Background: Absolute anchorage systems have enhanced orthodontic treatment efficiency and anchorage control. Buccal shelf screws are advantageous due to their extra-radicular placement and minimal invasiveness; however, their success is highly dependent on accurate placement and angulation.

Purpose: To design a simple, accurate, and cost-effective implant guide for precise buccal shelf screw placement.

Materials and Method: An elastomeric impression of the mandibular arch extending to the buccal shelf was obtained. The intended insertion site was marked 7–8 mm apical between the first and second molars at the archwire level. An implant guide was fabricated using an 11-mm stainless-steel wire with spikes soldered at 60° and 70°. Guided drilling and trial screw insertion were performed, followed by cone beam computed tomography (CBCT) verification and final screw placement.

Results: The guide enabled accurate buccal shelf screw placement at the desired angulation (60°-70°), with CBCT confirming precise positioning and minimal deviation. The technique was simple, reliable, and time-efficient.

Conclusion: The proposed implant guide allows predictable and accurate buccal shelf screw placement while minimizing procedural errors and simplifying clinical application.

Corresponding Author: Ashwini Sanjay Gundawar, Dept. of Orthodontics and Dentofacial Orthopaedics, Dr. Rajesh Ramdasji Kambe Dental College, Kanheri, Akola, Maharashtra 444003, India. Tel: +8149995587 Email: ashwinig303@gmail.com

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Introduction

Absolute anchorage systems have transformed contemporary orthodontics by providing enhanced anchorage control and expanding treatment possibilities. Skeletal anchorage devices such as infrazygomatic crest screws in the maxilla and buccal shelf (BS) screws in the mandible are particularly advantageous because of their extra-radicular placement, minimal surgical invasiveness, and ability to permit unrestricted tooth movement [1].

The mandibular BS offers favorable anatomical characteristics for orthodontic screw placement, including dense cortical bone extending from the first molar region to the external oblique ridge. Pathak *et al.* [2] and Athira *et al.* [3] have identified the optimal insertion site between the first and second molars, approximately 7 mm apical to the alveolar crest, with an insertion angulation of 60°-75° to minimize root proximity and enhance primary stability [2-4].

Despite these advantages, accurate placement of BS screw remains clinically challenging. Primary stability is influenced by bone density, cortical thickness, insertion depth, and proximity to adjacent anatomical structures such as dental roots, nerves, and blood vessels [5-6]. Freehand placement without guidance increases the risk of angular deviation and iatrogenic injury. Although several guiding techniques have been proposed, including radiographic templates and computer-aided design/ computer-aided manufacturing (CAD/ CAM)-based sur-

gical guides, these methods are often technique sensitive, time-consuming, and may involve additional radiation exposure [7-9].

Therefore, there is a need for a simple, accurate, and cost-effective guiding method that facilitates predictable BS screw placement in routine clinical practice. The present study introduces an implant guide designed to improve placement accuracy while minimizing procedural complexity and clinical errors.

Materials and Method

An elastomeric impression of the mandibular arch was made, ensuring it extended adequately to cover the BS area in the region of the 2nd premolar, 1st molar and 2nd molar (Figure 1). A reference line corresponding to the level of the archwire was drawn on the impression to serve as a guide for vertical measurements (Figure 2). From this line, a point located approximately 7-8mm apically between the 1st and 2nd molars was marked to indicate the proposed site for BS screw insertion (Figure 3).

An implant guide was fabricated using a stainless-steel straight wire of 11mm length. Two stainless-steel spikes were soldered onto this wire at angulations of 60° and 70°, thereby forming a simple, yet precise guide for screw placement (Figure 4). The fabricated guide was then positioned adjacent to the marked insertion point on the impression (Figure 5).

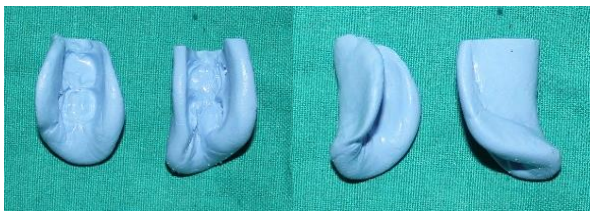

Figure 1: Impression Making

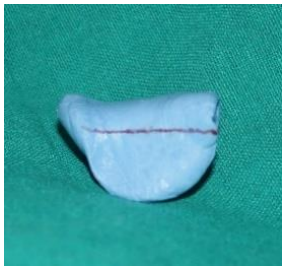

Figure 2: Reference Line Marking

Figure 3: Point Marking

Using this guide, initial drilling was performed with an air-rotor handpiece, maintaining the angulations defined by the guide spikes to ensure accurate trajectory (Figure 6). A BS screw was then temporarily inserted at the prepared site, and a CBCT scan was taken to verify the precision of placement and angulation (Figure 7) [6]. Upon confirming correct position, the final BS screw was inserted following the 60°-70° angulation indicated by the guide, ensuring accurate orientation, optimal engagement of cortical bone, and enhanced stability of the implant (Figure 8). Based on biomechanical evidence from finite element analysis studies indicating favorable stress distribution at angulations between 60°

Figure 4: Fabrication of Implant Guide

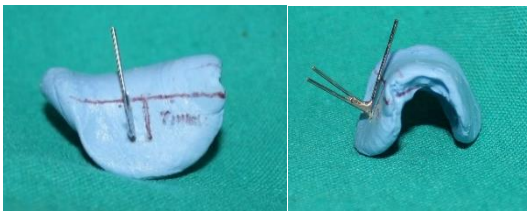

Figure 5: Positioning the Guide

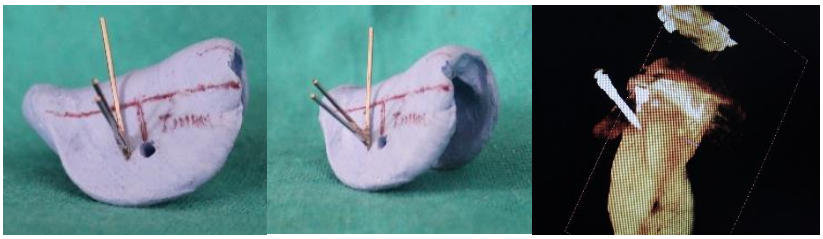

Figure 6: Initial Drilling

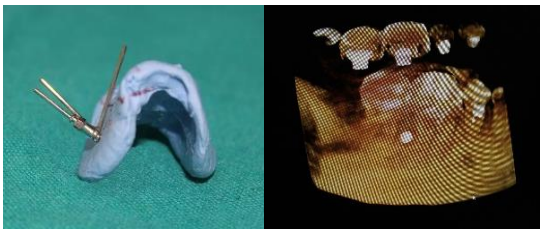

Figure 7: Trial Screw Insertion and Verification

and 70°, the intended insertion angulation was standardized at 65° [10]. The implant guide incorporated reference spikes at 60° and 70° to ensure controlled placement around the predefined angulation.

Results

The fabricated implant guide demonstrated excellent accuracy in directing BS screw placement. The CBCT verification confirmed that the screws were positioned at the intended 60°-70° angulation with minimal deviation. The use of the guide ensured consistent screw trajectory, optimal cortical bone engagement, and enhanced primary stability. Clinically, the procedure was simple, time-efficient, and reproducible, reducing the risk of angulation errors and soft tissue injury. Overall, the implant guide proved to be a reliable, economical, and precise aid for BS screw insertion.

Discussion

Accurate placement and angulation of BS screws are critical for achieving optimal stability and preventing complications such as root proximity, cortical bone perforation, or screw failure. Conventional freehand placement often relies on operator experience, which can lead to variability and reduced precision. The implant guide presented in this study provides a simple, reproducible, and economical solution for guiding BS screw insertion.

By using elastomeric impression material and a stainless-steel wire guide with predetermined angulations of 60° and 70°, the clinician can achieve consistent and controlled screw orientation. This approach eliminates the need for complex digital or radiographic guides, reducing chairside time and patient radiation exposure. CBCT verification confirmed that the screws placed using this guide closely matched the intended trajectory, ensuring optimal engagement with cortical bone and enhanced primary stability.

Compared to other guiding systems that require 3D printing or laboratory fabrication, this method offers ease of construction, low cost, and clinical adaptability. Therefore, the described guide represents a practical and efficient tool that simplifies BS screw placement while maintaining high accuracy and predictability.

Conclusion

This accurate yet simple and effective implant guide, made of an elastomeric impression with a customized angle indicator, provides insight into the precise placement of BS implants. It differs from other implant guides mentioned in the literature in that it is easier to fabricate, more economical, time-saving, reliable, and less cumbersome for patients, with reduced radiation exposure.

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Consent was obtained from the patient for treatment, sharing of photographs.

Ethical Approval

Not applicable

Limitations

This study was limited to a single clinical scenario without a control or comparative group, which restricts generalizability and precludes quantitative comparison with other guiding techniques. The evaluation was confined to immediate placement accuracy and primary sta-

Figure 8: Final Insertion

bility, without assessment of long-term clinical performance, anatomical variability of the BS, or potential variability related to manual guide fabrication.

Conflicts of Interest

The authors declare no conflicts of interest.

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