Device for Holding a Mini Implant Placement Guide

Abstract

Introduction: Generally, a mini implant is a device which is used for fixing the bones. It helps in augmenting orthodontic anchorage. It is done wherein either by direct or indirect anchorage which further is getting removed subsequently after being used. **Objective**: The objective of the present research is to provide a device for holding a mini implant placement guide. Another objective of the present research is to provide a device for holding a mini implant placement guide, which provides accurate placement of a mini implant in three planes of space, namely, sagittal, vertical and transverse. **Method:** The device is configured on a dental brace. The device is provided with an engaging member, an operating member, a vertical arm and a horizontal arm. The engaging member is having two engaging legs. **Result:** The present research provides a device which is used in an orthodontics treatment. The orthodontics is a dental specialty that aids in the correction of the alignment of teeth, with respect to the skeletal form, and a soft- tissue relationship of a patient undertaking the treatment. **Conclusion:** The present research provides a device for holding a mini implant placement guide. Also, the device provides accurate placement of a mini implant in three planes of space, namely, sagittal, vertical and transverse. Further, the device help in the placement site decision mesiodistally, as well as the vertical positions of the crown-to-root areas can be determined.

Keywords: implant placement guide, dental brace, device, orthodontic anchorage, dentoalveolar structures

Introduction:

Generally, a mini implant is a device which is used for fixing the bones. It helps in augmenting orthodontic anchorage. It is done wherein either by direct or indirect anchorage which further is getting removed subsequently after being used[1-3]. The uses of the mini implant placement guides are for proper placement of mini implants[4-5]. The proper positioning of implants avoids any interferences with the surrounding dentoalveolar structures[6]. Also, the stability of the implant is a major important factor for an Orthodontist. The orthodontist should also take into consideration for any intervention of the adjacent anatomical structures, such as dental roots, nasomaxillary cavities, and neurovascular tissues.

The currently available devices for the mini implant are a periapical radiograph which needs to be at hand to check root positioning and the amount of interradicular space available for insertion of the mini-screw[7-8]. One can use infiltration anesthesia in this case. But the existing device is not having proper angulation and insertion technique that may lead to mini-implant failure. Also, determining a proper vertical height for placement is difficult and an accurate mesiodistal placement point is difficult between the two adjacent roots. Also, as it is an arbitrary method there are chances of deviating from the path of insertion. Also, the existing devices are not having provision for measuring horizontal and vertical distances or accurate placement of mini implants. And the placement of mini implants without any proper stents or guides can be dangerous and orthodontists may be dealing with unnecessary risk factors. To overcome one or

all drawbacks of the existing device, there is a need for a device for holding a mini implant placement guide, the device is configured on a dental brace.

Objective of the research

The objective of the present research is to provide a device for holding a mini implant placement guide. Another objective of the present research is to provide a device for holding a mini implant placement guide, which provides accurate placement of a mini implant in three planes of space, namely, sagittal, vertical and transverse.

Method

The device is configured on a dental brace. The device is provided with an engaging member, an operating member, a vertical arm and a horizontal arm. The engaging member is having two engaging legs. The two engaging legs are connected by the horizontal arm. The engaging member is removably arranged on the dental braces with a substantial distance between the two engaging legs. The engaging member is provided for placing the device in the mouth of a patient for holding the mini-implant placement guide on the teeth of the patient who is undertaking the orthodontic dental treatment. The operating member is operably connected to the horizontal arm of the engaging member. Specifically, the operating member is slidably arranged on the horizontal arm. The operating member is linearly movable along the horizontal arm. Similarly, the vertical arm is operably connected to the operating member. The vertical arm is slidably arranged on the operating member. The vertical arm is having the mini-implant placement guide arranged at a distal end. More specifically, upon operating the operating member, the vertical arm moves translationally thereby guiding the mini-implant placement guide. In the present embodiment, the vertical arm is calibrated in terms of millimeters thereby providing the exact location for placement of a mini implant.

Further, the operating member is having two operating knobs such as a first operating knob and a second operating knob. The first operating knob is arranged on the horizontal arm and the second operating knob is arranged on the vertical arm. The first operating knob is provided for operating the linear movement of the operating member on the horizontal arm and the second operating knob is provided for operating the translational movement of the vertical arm.

Further, the horizontal arm is a rack arrangement with a pinion configured inside the operating member. Upon operating the first operating knob, the pinion engages with the rack enabling the movement of the operating member along the horizontal arm. Similarly, the vertical arm is also a rack arrangement with a pinion configured inside the operating member. Upon operating the second operating knob, the pinion engages with the rack enabling the translational movement of the vertical arm. Thereby guiding the implant placement guide for placement at an accurate position to avoid damaging of dental roots.

Result and Discussion

The present research provides a device which is used in an orthodontics treatment. The orthodontics is a dental specialty that aids in the correction of the alignment of teeth, with respect to the skeletal form, and a soft- tissue relationship of a patient undertaking the treatment. The field of orthodontic treatment is associated with various types of fixed appliances which may include brackets that are attached to the teeth by adhesive, and an archwire that is attached to the brackets. Specifically, in the orthodontics treatment, the brackets are passive components of

fixed orthodontic appliance, bonded to the enamel which provides the means to transfer the force applied by the activated archwire to the tooth.

The archwire is made of stainless steel, cobalt-chromium alloy, titanium–nickel alloy, and titanium–molybdenum alloy and used to provide the required force to move improperly aligned teeth to their proper positions. The orthodontic archwire is connected to the slots of the brackets (orthodontic the brackets) adhered to each tooth. Specifically, the main aim of the orthodontist treatment is to maximize the desired tooth movement and minimize undesirable effects with three-dimensional control. For achieving this, a mini implant (not shown) is used, to gain maximum anchorage for each tooth.

In the present embodiment, the mini implant is used in orthodontics as a temporary anchorage device which is temporarily fixed to the bone to enhance the anchorage either by supporting the teeth of the reactive units or by obviating the need for the reactive unit altogether, and the mini implant is subsequently removed after use. The mini implant is used for delivery of differentiated force systems for posterior tooth movement or extrusion of impacted canines where mini-screws are used as anchorage for tooth movements in cases to achieve class one molar relationship by molar distalization. Also, the mini implants are used as an orthodontic anchorage for maxillary expansion, maxillary protraction.

In another embodiment, the mini implant may also be used in some cases as an alternative to orthognathic surgery. A critical step that determines the success of the mini implant is the atraumatic surgical placement of the mini implant. Precise pre-surgical planning is very important to avoid damaging dental roots and to provide an estimation of bone quantity and allow for careful selection of diameter and length of micro-implants, placement site and direction of placement.

Conclusion

The present research provides a device for holding a mini implant placement guide. Also, the device provides accurate placement of a mini implant in three planes of space, namely, sagittal, vertical and transverse. Further, the device help in the placement site decision mesiodistally, as well as the vertical positions of the crown-to-root areas can be determined. Furthermore, the device is accurate, easy, reliable, and stable. Moreover, the device is compact, economical and robust in operation. The device is being configurable on a dental brace. The device is having an engaging member, an operating member, a vertical arm and a horizontal arm. The engaging member is having two engaging legs connected by a horizontal arm. The engaging member is arranged on the dental brace with a substantial distance between the two engaging legs. The operating member operably connected to the horizontal arm. The operating member is linearly movable along the horizontal arm. The vertical arm operably connected to the operating member. The vertical arm having the mini-implant placement guide arranged at a distal end. The vertical arm moves translationally upon operating the operating member thereby guiding the mini-implant placement guide.

References

1. Singh, K., Kumar, D., Jaiswal, R. K., & Bansal, A. (2010). Temporary anchorage devices–Mini-implants. National journal of maxillofacial surgery, 1(1), 30.

2. Rastogi, N., Kumar, D., & Bansal, A. (2011). The role of implants in orthodontics. Journal of Dental Implants, 1(2), 86.

3. Yamaguchi, M., Inami, T., Ito, K., Kasai, K., & Tanimoto, Y. (2012). Mini-implants in the anchorage armamentarium: new paradigms in the orthodontics. International journal of biomaterials, 2012.
4. Kim, S. H., Kang, J. M., Choi, B., & Nelson, G. (2008). Clinical application of a stereolithographic surgical guide for simple positioning of orthodontic mini-implants. World journal of orthodontics, 9(4).
5. Sharma, K., & Sangwan, A. (2014). KS micro-implant placement guide. Annals of medical and health sciences research, 4(3), 326-328.
6. Abdulgani, A., Kontoes, N., Chlorokostas, G., & Abu-Hussein, M. (2015). Interdisciplinary Management Of Maxillary Lateral Incisors Agenesis With Mini Implant Prostheses: A Case Report. IOSR-JDMS, 14(12), 36-42.
7. Mizrahi, E., & Mizrahi, B. (2007). Mini-screw implants (temporary anchorage devices): orthodontic and pre-prosthetic applications. Journal of Orthodontics, 34(2), 80-94.
8. Kim, H., & Kim, T. W. (2011). Histologic evaluation of root-surface healing after root contact or approximation during placement of mini-implants. American Journal of Orthodontics and Dentofacial Orthopedics, 139(6), 752-760.