

THE ACCURACY OF IMPLANT PLACEMENT WITH SURGICAL GUIDE STENT IN THE KINGDOM OF SAUDI ARABIA

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ABSTRACT

Introduction: The stent is defined as an appliance used for the evaluation of the height and width of the available bone that can be used in the surgical field to provide an optimum site for the implant. The stent should be transparent, stable, and rigid. For stabilization, the stent should cover enough teeth, and when there are no teeth it should extend to unreflected tissue.

Objectives: The purpose of this study is to assess the effectiveness of surgical stents to simplify implant placement in the Kingdom of Saudi Arabia.

Methods: This retrospective radiological study was done by selecting implant cases placed in Saudi Arabia. All the implant cases in the study were placed by using a conventional stent. A total of 87 implants cases were selected randomly. The inclusion criteria were: Presence of panoramic radiograph, no bone defect, dentulous patients, using conventional surgical stents, and treatments in Saudi Arabia. The sample size was 87 cases collected from March 2020 to December 2020.

Results: A total of 87 implants were examined through the radiograph, 49 (56.32%) implants were in the mandible and 38 (43.68%) were in the maxilla. Regarding the position of the implant, most of the implants 64 (73.56%) were successfully placed within the standard range (minimum 1.5mm between the implant and the tooth, 3.5mm between implants and implants). The analysis shows that 14 (16.09%) implants were less than the standard range, 7 (8.04%) in the maxilla, and 2 (2.29%) in the mandible.

Conclusion: The study shows the high accuracy in implant placement using a conventional surgical stent. Besides, the study indicates its advantage of being easier and cheaper comparing to another technique although it can provide similar success if done correctly and precisely.

Key words: Implant, Surgical stentm, teeth.

Introduction

Per-Ingvar Bränemark - a Swedish orthopedist – introduced what is called osteointegration in the 1970s in the dental field.¹ The Bränemark technique depends on using biocompatible material like titanium alloy that can be implanted into the alveolar process.² Clinical and laboratory complications of implants can occur due to malalignment.³ The stent is defined as an appliance used for the evaluation of the height and width of the available bone that can be used in the surgical field to provide an optimum site for the implant. The stent should be transparent, stable, and rigid. For stabilization, the stent should cover enough teeth and when there are no teeth it should extend to unreflected tissue.^{4, 5} Conventional surgical stent is superior to the computer-aided surgical guide of being easier in fabrication,

cheaper, cost-effective, and exposing less radiation to the patient.⁶ Despite all the development, placing a dental implant remains a challenging aspect. Using a panoramic radiograph can lead to an undesired result, which requires the need for a three-dimensional radiograph.⁷

However, transferring the proper position of the implant abutments to the laboratory can be difficult⁸⁻¹¹. In addition, angulation of mandibular free-end saddles may affect the pressure from the prosthesis on the abutments so this might lead to cause high stress concentrated in some areas, eventually leading to implant failure.¹² Implants success mainly depends on three elements: depth, angulation, and position. Using a surgical stent has proven its significance to

provide better accuracy compared to the freehand technique.¹³ Using a surgical stent provides flapless placement of the implant, the drill can be done through the stent holes thus will lead to soft-tissue preservation.¹⁴ This study aims to assess the effectiveness of the surgical stent to simplify implant placement.

Methods:

This retrospective radiological study was done by selecting implant cases placed in Saudi Arabia. All implant cases in the study were placed by using a conventional stent. A total of 87 implants cases were selected randomly. The inclusion criteria were: Presence of panoramic radiograph, no bone defect, dentulous patients, using conventional surgical stents, and treatment in Saudi Arabia. To measure the accuracy of the angulations and location of the implant, special software for radiographic analysis was used (MiPACS Dental Enterprise Viewer Version 3.1.1130). The intraoral radiograph was used to determine the relationship between the implant and the adjacent tooth and between the implant and implant. The definitive angulation of the implant was determined by drawing a line in the long axis of the adjacent tooth then compared to the placed implant. Measuring the accuracy of implant location was determined by comparing the implant to those values “minimum 3 mm between two adjacent implants” or “minimum 1.5 mm away from adjacent tooth”.¹⁵ Before the start of the study calibration exercises were done to ensure reproducibility. The efficacy of stents was then evaluated after the surgical part of implant placement, with the help of a radiograph.

Results:

A total of 87 implants were examined through the radiograph, 49 (56.32%) implants were in the mandible, and 38 (43.68%) implants were in the maxilla. Regarding the position of the implant, most of the implants 64 (73.56%) were successfully placed within the standard range (minimum 1.5mm between the implant and the tooth, 3.5mm between implants and implants). The analysis shows that 14 (16.09%) implants were less than the standard range, 7 (8.04%) in the maxilla and 2 (2.29%) in the mandible, regarding the angulations of the implant. Implant to implant angulations shows a highly parallel relation with less than 5-degree divergent angulations. The analysis shows slight off angulations between tooth to the implant. The range of angle between tooth and implant was between (5 to 25 degree), and the analysis shows higher parallelism in the mandible than

the maxilla. There are more divergent angulations in the posterior molars comparing to premolars in both arches.

Discussion:

The positioning of the dental implant is considered to be one of the most challenging aspects. Using a surgical guide is a vital tool for successful treatment.¹⁶ It has been claimed that dental implants placed using surgical guides are higher in accuracy and more precise.^{17,18} As the surgical guide will aid in more accurate angulations of the dental implant, this will lead to a more pleasing prosthesis aesthetically and functionally.¹⁹ Recently several guide techniques are available, and each type gives certain advantages, however, a computer-aided design surgical guide will increase the cost, needs more experience, needs special machines, and exposes the patient to more radiation. On the other hand, a conventional surgical guide is easier to construct, cheaper, does not expose the patient to more radiation, and will give accurate implant placement. The disadvantage of the conventional surgical guide is the inability to control the apico-gingival distance of the implant.⁶ Stabilization of conventional surgical guide can be achieved by the neighboring teeth or it can be achieved by extending to unreflected structures such as retromolar regions.¹⁴ Failure in obtaining a parallel and properly positioned implant can lead to non-axial loading of implant-supported prostheses that would lead to undesired occlusal loading and result in implant failure.²⁰

Conclusion:

The study shows the high accuracy in implant placement using a conventional surgical stents. In addition, the study indicates its advantage of being easier and cheaper comparing to another technique, although it can provide similar success if done correctly and precisely.

Conflicts of Interest:

The authors have no conflicts of interest to declare.

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