

A RE-INNOVATIVE RADIOGRAPHIC TECHNIQUE FOR THE EVALUATION OF MARGINAL BONE LOSS AROUND IMPLANTS

Kanwardeep Singh Sohi¹, Sunil Kumar M.V², Harikesh Rao³, Vela Desai⁴, Monika Goswamy⁵

Reader, Department of Prosthodontics and Crown & Bridge, Shaheed Kartar Singh Sarabha Dental College And Hospital, Sarabha, Ludhiana, Punjab¹

Professor and Head, Department of Prosthodontics and Crown & Bridge, Jaipur Dental College Jaipur, Rajasthan²

Professor, Department of Prosthodontics and Crown & Bridge, SDM College of Dental Sciences and Hospital, Dharwad, Karnataka³

Professor and Head, Department of Oral Medicine and Radiology, Jaipur Dental College Jaipur, Rajasthan, ⁴

Professor – Department of Periodontics, SDM, College of Dental Sciences and Hospital, Dharwad, Karnataka⁵

Abstract

Standard dental radiographs allow the clinician to make an assessment of marginal bone loss around implants. Radiovisiography is useful as it produces an instant image at a lower radiation dose. Only a relatively small deviation from the correct angulation may make it difficult to compare with the baseline radiographs and evaluate marginal bone loss. In this article a radiographic technique with the help of intra-oral grid was used to evaluate the bone loss around the implants. The conventional intra-oral holder with intra-oral grid was indexed by the use of soft putty which helped in reproducing positioning of the holder for evaluation of crestal bone loss after the implant placement around the implants.

Key words: Hawe X-Ray Sensor Holder System, Dental X-Ray mesh gauge, Crestal Bone loss

Introduction

Implant dentistry is unique in its ability to restore the patient to normalize the contour, function, patient comfort, esthetics, speech and health regardless of the atrophy and disease. Preservation of the tooth structure, preservation of bone, provision of additional support, resistance to disease are some of the merits implants therapy has over conventional fixed or removable treatment options. Implant supported prosthesis definitely has an edge over the other treatment options as its longevity is greater than fixed partial denture, no preparation required for adjacent teeth, decreased risk of caries and endodontic therapy of the adjacent teeth, improved hygiene and esthetics of abutment teeth leading to decreased risk of abutment tooth loss, it provides an added psychological advantage to the patient with maintenance of bone in edentulous region¹.

The long term success of dental implants is evaluated radiographically by the absence of any pathology and an unusual rate of bone loss around the implants.² For adequate diagnosis and review of crestal bone changes many diagnostic methods have been evaluated^{3,4} in which intraoral radiographs play an integral part, however reproducing positioning is very difficult.

Various film holding devices have been documented that attach to implant abutment or prosthesis to standardize image geometry.⁴⁻⁷ With

digital enhanced radiographs numerous techniques adjuvant with computer-assisted measurements, ruler, caliper, and supra bony thread evaluation have shown to give permissible results.^{8,9}

This article describes a re-innovative technique in which digital sensor holder with dental X-Ray mesh gauge is indexed to the adjacent dentition by putty which helped in reproducing the position for future evaluation of crestal bone changes post-operatively and post-prosthetic phases.

Clinical report:

A 45 years old female patient with good general health and well being reported to the Department of Prosthodontics, Jaipur Dental College, Jaipur, Rajasthan for replacement of lower posterior teeth. The patient's dental history revealed that she has lost her teeth due to decay and has been partially edentulous for the past 6 months. Various treatment modalities of a removable partial denture, an acid etched resin – retained prosthesis, maintenance of missing teeth orthodontically, a fixed partial denture and implant supported prosthesis were explained to the patient. Taking into consideration the various factors, implant supported prosthesis was planned for the patient. As part of the pre-surgical treatment planning, radiographic stent was prepared with a metal ball incorporated in it and patient was asked to take an orthopantomograph (Kodak 8000C Digital Panoramic and Cephalometric System with voltage of 71Kv,

electricity of 6.3 Ma and exposure time of 13.2 sec) with stent in place and magnification was noted and exact implant length was determined. Exact mesio - distal and bucco - lingual width was determined by ridge mapping procedure.¹² After length and width was determined a surgical template was made for the patient which helped in proper angulation to guide in implant placement. Surgical procedure was performed with sequential osteotomy as recommended by the manufacturers and the implants were placed at the predetermined depths. After adequate soft tissue healing, the implant abutments were connected and if any preparation was required it was done, impressions were made and provisional crowns were fabricated and cemented with temporary cement Templute eugenol free (Prime Dental Products Pvt. Ltd.) taking into care that the contacts are centrally oriented with no contact on light bite and light contact at heavy bite.¹³

Technique for Radiographic Evaluation:

- Hawe X-Ray sensor holder system is used for the conventional paralleling technique when making the radiographs.

- The sensor holder system with the dental X-Ray mesh gauge is tried in the patients mouth (**Fig 1**).
- Soft putty is mixed and placed distal to the sensor holder system and occlusal registration of the maxillary and mandibular teeth distal to the implant placement is made.
- Once the occlusal registration is positioned properly against the adjacent teeth, the digital sensor orientation should not be altered.
- Conventional paralleling cone technique is employed for making digital radiographs (**Fig 2**).
- The putty index can be isolated from the sensor holder system and is re-attached with the sensor holder system when further evaluation of crestal bone is done post – operative or post – prosthetic phase (**Fig 3**).
- Provisional crowns were removed, custom trays fabricated and final impressions made with putty and light body with a closed tray technique. Porcelain fused to metal crowns were fabricated and cemented with temporary cement Templute eugenol free.



Fig 1. Sensor holder system with dental X-ray mesh

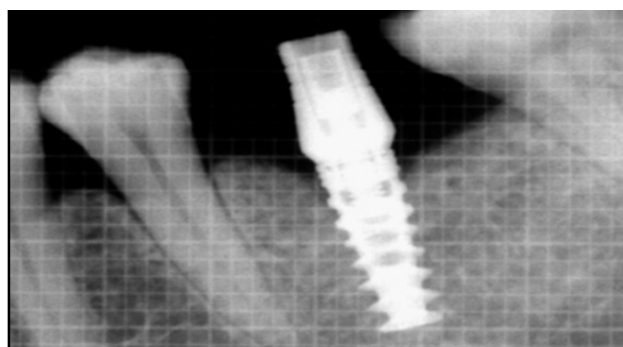


Fig 2. Conventional paralleling cone technique



Fig 3. Putty index re- attached with sensor holder system

Discussion:

Assessing peri-implant marginal bone levels play an integral part in the evaluation of the implant patient. For monitoring of marginal bone levels at implants and diagnosing interproximal bone loss radiographic technique including panoramic radiography and intra-oral radiography using long cone paralleling technique have been widely used.¹⁴ Panoramic radiography allows visualization of the entire implant, panoramic radiography has limitations which include image resolution and distortion, it also has inability to monitor facial and lingual/ palatal bone levels, low sensitivity in the detection of early bone changes and underestimation of bone loss.¹⁵ In conjugation with intra oral radiographs, grid calibration has been used which is superimposed on the scanned radiographs using CorelDraw software.¹⁶ In this particular study long cone paralleling technique with putty index was used so as to reduce the magnification and resolution error during any mesial-distal or bucco-lingual movement of follow up radiographs. A dental X-ray mesh gauge with a fine grid of pitch 1mm was used with the radiovisiograph so as to standardize the bone loss measurement procedure which was measured from the first macro thread of the implant.

The technique described is appropriate for single or short span multiple unit implant restorations. Long span or completely edentulous arches, shallow lingual sulcus, presence of tori, palatal vault contours, prominent gag reflex and psychological factors are some of the limitations in which this particular technique cannot be applied accurately.

Summary

The Hawe X-Ray sensor holder system is indexed to the adjacent dentition with the help of soft putty and accurate radiovisiograph is made to evaluate the changes in the bone at the crestal level.

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