Clinical and radiographic assessment of implant placement in esthetic zone; Review of literatures

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Abstract :

The purpose of implant dentistry is to restore the form , esthetics , comfort, health of the teeth and adjacent structure for human patient, there for many study try to get better esthetics result through creation and recontouring of papillae and normal gingival contour . Aim of the study was to compare and determine the success rate of esthetics between single implant tooth and multiple implants teeth after creation of inter dental / inter implant papillae be using scalloping technique (clinical and radio graphical assessment).

Introduction:

Today, gingival esthetics has become an essentially critical factor in the overall success of the implant- supported restoration. At the same time, the most complex and challenging aspect of implant dentistry is to reconstruct a predictable peri-implant papilla*(Furhauser etal.,2005)*. Loss of the alveolar bone and subsequent soft tissue changes occur particularly after periodontal and endodontic infection. When two or more adjacent teeth are extracted, there is loss in the vertical dimension of the edentulous ridge to an average of 4 mm in the buccal direction, which may further complicate papilla reconstruction*(Jemt etal., 1979)*. A variety of factors might influence the presence or absence of the papilla. Next to a single implant, the development of the peri-implant papilla was shown to be predominantly related to the marginal bone level and the integrity of the attachment level of the

neighbouring tooth ***(Ramanauskaite etal.,2018)***. On the other hand, the complete fill of the inter-implant mucosa is much more challenging between two implants and still considered to be unpredictable ***(Grunder etal.,2000)***. Although the problem with inadequate papilla (black hole disease) has been identified, and attempts have been made to correct the problem with various surgical techniques, the regeneration of the papilla adjacent to the dental implant is still difficult to perform and often not predictable ***(Kourkouta etal.,2009).***

Review:

1-Scalloped Implant Design For Creation of interdental/ interimplant papillae

Clinical trials have shown evidence of high implant survival and success rates in the maxillary anterior segment.***(Adell et al.,1990)***However,

most of the published studies do not include detailed evaluation of esthetic parameters.

A harmonious gingival display is highly valued by patients in this segment of the mouth and contributes significantly to facial expression.***(Adell et al.,1981).***

Patient satisfaction with maxillary anterior implants is unlikely to be met unless well-defined esthetic standards are addressed.

In single implant sites without tissue deficiencies, an esthetic treatment outcome is generally successful because it depends on the tissue support provided by the adjacent teeth. In contrast, the esthetic outcome of multiple adjacent implants presents a major challenge for the clinician.***(Jemt, 2003***)

The scalloped implant is designed to keep or create interdental bony peaks that support the soft tissue, thereby maintaining or creating interimplant papillae . ***(Wohrle,2003).***

The primary esthetic goal of the scalloped implant design is to avoid the dark, triangular space known as the ‘‘black triangle.’’ The space appears when bone

remodeling results in loss of osseous support for the papillae. ***(Nordland et al.,1998; Tarnow et al.,1992).***

The intention of the scalloped implant design is to influence the biology and preserve the interproximal bone. The manufacturer of the implant (Nobel Biocare, Yorba Linda, CA, USA) suggests that the implant design minimizes bone loss in the interproximal area of adjacent implants and enhances the formation of the interimplant papillae. Further, the design is expected to facilitate establishment of the biologic

width, which is influenced by the location of the implant–abutment interface . Scalloped hard and soft tissue apposition areas are noted features of the design. ***(Hermann et al.,2001***).

With regard to scalloped implant design, biologic considerations have been attentively analyzed and an attempt has been made to execute design concepts based on scientific principles. To date, however, theories of hard and soft tissue response to the scalloped implant design have not been clearly substantiated and a Medline literature review revealed that no compelling clinical evidence has been documented. No large randomized controlled trials or smaller observational clinical studies have shown that tissues actually respond consistently to the curvature design of the scalloped implant, as suggested by clinicians and the manufacturers of the device. The literature can offer only several reports of case studies that have provided no more than short-term outcomes.***(Hermann,2003; Mitrani et al.,2005)***.

Some of these publications provide a few illustrative radiographs, but no precise measurements of progressive bone loss have been presented by any of the investigators.

2-Techniques' For Creation of Inter implant/Inter dental papillae

According to the literature, maxillary anterior single-tooth implant crowns have yielded predictable results. The focus has now shifted to the soft tissue contour of single-tooth implant crowns. ***(Schmitt et al. ,1993).***

Palacci developed a unique additive surgical technique at stage 2 uncover for multiple implants. This crescent incision technique was very effective in providing a scalloped appearance to the soft tissue drape around the abutments. However, the volume of tissue was still inadequate to form an ideal interpapilla height. ***(Palacci,1995)***.

A surgical technique for interimplant papillae in an immediately loaded maxillary implant prosthesis was also presented by Kinsel and Lamb. This technique provides a scalloped appearance for multiple implants. With this procedure, the amount of soft tissue available for repositioning is usually inadequate and the interproximal region is raised only 1 to 3 mm.***(Kinsel et al.,2001)***.

Nemcovsky et al. presented an additional procedure that used the soft tissue over the implant site to augment the papillary form. With this technique, the actual interproximal papillae were not reflected and the increase in tissue adjacent to the teeth was miminal.***(Nemcovsky,2000)***.

3-Vertical Distance from the Crest of Bone to the Height of the Interproximal Papilla Between Adjacent Implants

The presence or absence of the interdental papilla between teeth. between implants and teeth, and between adjacent implants has received much attention in the past decade. With increasing demands for more natural looking restorations in the esthetic zone, clinicians must maintain a high level of skill and knowledge A clinical study related the presence or absence of the papilla between Two teeth to the distance from the crest of bone to the contact point between the teeth.***(tarnow ..etal,1992)..*** When this distance was 5 mm or less, the papilla completely filled this space almost 100% of the time. When the distance was 6 mm. the interdental

space filled about 55% of the time; and at 7 mm, the interdentally space was completely filled about 25%of the time.

When an implant is placed adjacent to a tooth, a <5 mm distance Between the contact point and the crest of bone shows similar results regarding presence or absence of papilla to that between two adjacent teeth. Grunder presented 10 case reports of single-tooth implants and stated that all the papillae reformed after the final crowns were placed on the implants.***(Grunder,2000)*** . This was also confirmed in a study on single-tooth implants by***(Choquet et al.2001).***

The difficulty of generating a papilla seems to be more prevalent between two implants. To date, there is no published research that measures the distance from the contact point to the alveolar crest between implants.***(Garber.. etal,2001)***

This measurement is in fact artificially determined by contact point manipulation, which can be placed at any height at the discretion of the clinician. Therefore, this measurement has little meaning as far as soft tissue biology is concerned.

In a recent report, it was shown that the distance between two adjacent implants should be at least 3 mm apart in order to preserve the interdental bone. This is related to the horizontal component of the biologic width around the implants.

However, placing implants 3 mm or more apart does not ensure that the papilla will reform. This mesial distal implant distance only prevents additional interproximal bone loss over what has occurred after extraction. Garber et al. measured the height of the papilla to the base of the pocket around two adjacent implants ***(Tarnow,2001).***

and showed that this distance averaged 4.5 mm. However, the crest of bone was not considered in this particular study. Elian et al., in a series of case reports, showed

that obtaining a 5 mm height of tissue between two adjacent implants was not

routinely possible. In fact, only about 3 mm of soft tissue height could be expected .*(Elian…etal, 2003).*

4-Optimizing Esthetics for Implant restoration in the Anterior Maxilla: Anatomic and Surgical Consideration

Over the past 10 years, dental esthetics has been an important issue in implant dentistry. At major conferences it is common to see lectures addressing various techniques for obtaining esthetic implant restorations. In the anterior maxilla, unsuccessful treatment outcomes can lead to disastrous clinical situations that can only be corrected with removal of the implant and subsequent tissue augmentation procedures. With this in mind, it is important to establish sound clinical concepts with clearly defined parameters that lead to successful esthetics in the anterior maxilla, with long-term stability of the peri-implant tissues. ***(Belser et al., 2004).***

Initiation of therapy starts with an understanding of the patient's desires. In most cases, the patient's primary demand is an esthetic tooth replacement offering a nice smile. For the dental clinician, the reestablishment of esthetics and function requires knowledge of all treatment modalities. Of the fixed options, conventional fixed partial dentures and implant-supported restorations should be objectively evaluated for their potential to provide long-term function and stability in a given situation. Today, implant-supported restorations often represent the best solution, because intact tooth structure and supporting tissues can be preserved. ***(Magne, 2002).***

Esthetic parameters that have been defined for conventional dental restorations can also be used for implant patients during preoperative planning. These parameters can help define potential risk factors for esthetic shortcomings. The main esthetic objectives of implant therapy from a surgical point of view are the achievement of a harmonious gingival margin without abrupt changes in tissue height,_maintaining intact papillae, and obtaining or preserving a convex contour of the alveolar crest. ***(Pradeep etal., 2006).***

Implant therapy in the anterior maxilla is challenging for the clinician because of the esthetic demands of patients and difficult pre-existing anatomy. In this area of the mouth, the clinician is often confronted with tissue deficiencies caused by various conditions. These conditions can be divided into 2 categories: anatomic and pathologic (Table 1-1).

Table (1): Clinical condition presenting tissue Deficiencies in the anterior maxilla

Conditions	**Remarks**
Anatomic Narrow alveolar crest and/or facial undercut of alveolar process	Congenitally missing teeth
Pathological, 1. Dental trauma	
2.Posttraumatic conditions	Tooth avulation with fracture of the facial bone plate Root ankyloses with infraocclusion, root resorption,root fractures
3.Acute or chronic infections	
4.Disuse bone atrophy	Periodontal disease, periapical lesions,endo/prio lesions Long-standing tooth loss

Tissue deficiencies often require bone augmentation procedures such as the guided bone regeneration (GBR) technique, which uses a simultaneous or staged approach to regenerate adequate volumes of bone to allow for implant placement. Soft tissue handling, precise implant placement in a restorative – driven 3-dimensional approach, and follow-up procedures represent a variety of challenges for the implant surgeon. ***(Buser, 2004)***

To successfully meet the challenges of esthetic implant dentistry in daily practice, a team approach is advantageous and highly recommended. The team includes an implant surgeon, a restorative clinician, and a dental technician who preferably has advanced knowledge and clinical experience. In special situations, an orthodontist can supplement the team. The successful implant surgeon working in the esthetic zone should have a good biologic understanding of tissue response to implant placement, a thorough surgical education enabling performance of precise and low-trauma surgical procedures, and a large patient pool providing sufficient surgical experience with esthetic implant placement. ***(Garber et al., 1995).***

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