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Dr. Priyanka Chopra
Department of Periodontology
SGT Dental College, SGT
University, Gurgaon, Haryana,
India

Dr. Shalini Kapoor
Department of Periodontology
SGT Dental College, SGT
University, Gurgaon, Haryana,
India

Dr. Anjali Dudeja
Department of Periodontology
SGT Dental College, SGT
University, Gurgaon, Haryana,
India

Correspondence
Dr. Priyanka Chopra
Department of Periodontology
SGT Dental College, SGT
University, Gurgaon, Haryana,
India

DynaMatrix: To increase keratinized tissue thickness at the time of implant placement: A case report

Dr. Priyanka Chopra, Dr. Shalini Kapoor and Dr. Anjali Dudeja

Abstract

The adequate amount of keratinized mucosa to maintain health around implants is controversial. Recently, a xenogenic extracellular collagen matrice was successfully used to augment keratinized tissue around teeth and implants reporting comparable results to that achieved with auto grafts. A 34 year male patient complains of missing tooth in lower right back tooth region. He was having deficient keratinized tissue thickness i.e 1.81 mm. The xenogenic extracellular membrane placed over the bone on the buccal aspect of the implant at the time of implant placement. After 3 months it shows increased in keratinized tissue thickness i.e 3.4 mm. Color, Contour and texture was comparable with contralateral site.

Keywords: Keratinized tissue thickness, implant placement

Introduction

The clinical concept of the need of a certain dimension of keratinized mucosa to maintain the stability of the soft tissue lining and to preserve periodontal health has evolved in the last 30 years. Keratinized mucosa (KM) although not essential to the existence of a tooth and its attachment apparatus does enhance the long term survival of tooth. It is evident that the presence of KM is especially important around restoration and prosthesis or of the tooth in a dentition susceptible to periodontal breakdown ^[1]. There has been considerable discussion whether the extent of KM adjacent to implant bear the same significance as to natural teeth. The adequate amount of keratinized mucosa to maintain health around implants is still controversial; but its absence has been associated with a greater accumulation of plaque and inflammation, not with increased peri-implant bone loss, though ^[2].

A good condition of keratinized tissue around implants relate to healthier tissue, less bone loss, and improved esthetics. There are several alternatives to improve the amount and thickness of soft tissue around the implants, the subepithelial connective graft being the main one. However, they require a donor site and a second surgery, greater postoperative discomfort and the graft volume depends on the anatomy of the host. Xenografts may be a good alternative to connective tissue grafts since they have proved to have a uniform thickness of graft, be easy to handle, provide good esthetics and reduce treatment morbidity for patients.

Recently, a xenogeneic extracellular membrane was successfully used to augment keratinized tissue around teeth and implants supported fixed prosthetic restorations, reporting comparable results to those achieved with autografts. This xenogenic extracellular membrane is obtained from the submucosa of the small intestine of pigs using a process that retains the natural composition of matrix molecules such as collagens, glycosaminoglycans, glycoproteins, proteoglycans and growth factors ^[3]. This product consist of two functional layers: a intact layer (with signals) and a stripped (scaffold only). These layers consist of two of the three essential biological components required for healing: Matrix scaffold and signals, which include growth factors and extracellular matrix cell receptor mediated binding sites. Once implanted, these components work together to stimulate the recruitment of the body's cells, which in turn become the third component critical to healing. As an extracellular matrix, it retains both the 3-dimensional structure and the signaling proteins important for soft tissue regeneration. The biologic material guides the patient's soft tissue to form organized tissue. Very few research activities have focused on the development of techniques & materials for augmentation of the soft tissue around dental implants especially if placed in areas with reduced keratinized tissue.

Case Presentation

A 34 year male patient reported in the Department of Periodontics, SGT Dental College, with the chief complains of missing tooth in lower right back tooth region and wants to get the fixed prosthesis done. On Clinical examination edentulous span seen wrt 47. He was having deficient keratinized tissue thickness i.e 1.01 mm. It is generally considered that a more ideal and functional soft tissue implant interface can be established if adequate zone of KM (2mm) is present. As reported by various studies that absence of adequate amount of keratinized tissue has been associated with a greater accumulation of plaque and inflammation. There are several alternatives to improve the amount and thickness of soft tissue around the implants. Here we have used Dynamatrix extracellular membrane. It is used to augment keratinized tissue around teeth and implants supported fixed prosthetic restorations, reporting comparable results to those achieved with autografts.

At Baseline Visit (V₁)

At baseline visit patient received the supportive periodontal treatment consisting of professional prophylaxis (scaling and root planing), oral hygiene instructions, impression recording, blood tests, IOPA x-rays and clinical photographs.

At Visit 2(V₂)

Immediately before the surgical procedure following clinical parameters will be recorded for all patient

- The thickness of gingiva around dental implants: It will be measured approximately 2mm apical to the gingival margin on the midbuccal aspect of the implant site using stent as reference. After application of topical anesthetic, the thickness will be measured by gently inserting a endodontic probe with a rubber stopper in the tip until the underlying hard tissue has been contacted and by using boley gauze.
- Color, contour and texture of soft tissue: Two examiners will do calibration for reproducibility of the clinical rating of color, texture, and contour at the treatment site, compared to the contralateral site used as reference, with the following 3-point scoring system: 0 (unnatural/obvious difference), 1 (fairly natural/moderate difference), and 2 (natural/no difference) along with clinical photographs.

Treatment Phase

Patient was premedicated with antibiotic prophylaxis (amoxicillin 2,000 mg or clindamycin 600 mg), depending on the history of drug allergy, 1 hour prior to implant placement surgery. The surgical technique used in the treatment group will consist of the following steps: Following administration of the appropriate local anesthesia (lidocaine hydrochloride

At Baseline



Preoperative Photographs



Measuring the tissue thickness using endodontic file



Using Boley Gauge



[HCl] 2% with 1:80,000 epinephrine), crestal incisions was made extending through the papillae on either side of the implant site. A full-thickness flap elevated in an apical direction to expose the buccal plate of bone. The implant was placed in an ideal position according to the surgical guide. Resonance frequency analysis (RFA) will be recorded to measure the implant stability, high stability (ISQ>72), moderate (ISQ68-72) and low (ISQ<68) [30]. This patient was having RFA value of 79. Following RFA, a healing abutment was placed. The xenogenic extracellular membrane then contoured and placed over the bone on the buccal aspect of the implant, 2 to 3 mm mesially, distally, and apically to the implant with its superior margin at the implant-abutment junction. The membrane shall be applied dry over the prepared site, held in place with very light pressure to cover the site and hydrated with patient's blood. Out of the two functional layers of membrane a intact layer (with signals) will be placed toward soft tissue surface and a stripped layer (scaffold only) will be placed toward bone surface. The flap was coronally placed or advanced and sutured to cover the membrane. Suturing was performed with (Ethicon 4-0 silk). Postoperative instructions was given to the patients.

Postoperative Assessment

Patient continue the same antibiotics for 5-7 days and prescribed appropriate analgesics. Patient was instructed to rinse twice daily with a chlorhexidine mouthrinse (0.12%) during the first 2 weeks and to avoid brushing and using interdental cleaning devices next to the treated area. He was also be told to avoid chewing on, or inflict any trauma, to the treated area.

Visit 3

Patient was recalled 7 to 14 days after surgery for suture removal, if required, and postoperative evaluation.

Visit 4(Follow up visit)

After 3 months following parameters will be recorded

- The thickness of gingiva around dental implants(as measured at visit 2)
- Color, contour and texture of soft tissue(as observed at visit 2)
- Pocket probing depth: It will be measured to nearest millimeter using a 15 mm graduated plastic periodontal probe at the midfacial and interproximal surfaces of each implant.

The tissue thickness after 3 months was 3.4 mm. color, contour and texture of implant site shows no difference with contralateral site. Pocket probing depth at implant site was 2mm at mesiobuccal, 2 mm midbuccal and 4 mm at distobuccal aspect.

Intraoperative



Incision



Flap Reflection



Radiograph showing implant placement



RFA Value



Dynamatrix membrane



Membrane placement



Suture placement

After 3 Months



Measuring the tissue thickness using endodontic file



Using Boley Gauge



Probing depth

Discussion

The role of peri-implant soft tissue in maintaining and facilitating implant health has been evaluated; however, the research is equivocal. The need for keratinized tissue (KT) around implants has been questioned [4, 5]; however, more recent cross-sectional studies have demonstrated that KT and peri-implant soft tissue thickness positively correlates with the health of the peri-implant tissues and clinical parameters. In addition, little or no KT along with thin soft tissues have been associated with reduced tissue health, which in turn has been associated with higher levels of bone loss [6, 7, 8]. The conflicting evidence suggests the need for KT and increased tissue thickness around implants may be variable and patient-specific. At baseline, the treated implant site exhibited soft tissue deficiency the investigators considered potentially predictive of an increased risk for development of peri-implant mucositis or peri-implantitis.

A new xenogeneic, extracellular collagen matrix (Dynamatrix) has been studied as a connective tissue graft (CTG) alternative for root coverage and generation of KT around teeth and implants [7-11].

The results demonstrated that placement of Dynamatrix was found successful to augment keratinized tissue at 3 months follow up.

The procedure resulted in minimal pain and swelling, and a mean increase in soft tissue thickness of 1.06 mm was obtained. This increase is only slightly less than reported with the use of CTGs and different surgical techniques (1.75 mm and 1.3 mm).

Conclusion

- It could be concluded that Dynamatrix membrane leads to a significant increase of peri-implant soft-tissue thickness and may serve as an alternative to connective tissue grafting.
- Color, Contour and texture was comparable with contralateral site.
- Probing depth at implant site was normal

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