

Management of Periimplant Mucosal Inflammation- A Clinical and Histologic Report

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Abstract

Periimplant mucositis is a reversible soft tissue inflammation around implants without causing marginal bone loss and if left untreated can progress to periimplantitis. Periimplant mucositis is considered as a common entity in the present scenario of implant failure. The prevalence of periimplant mucositis is about 8-44 % as per Adell et al 1986. Accumulation of biofilm is considered as the primary etiological factor for peri-implant mucositis along with other risk factors like smoking, radiation therapy etc. Mechanical debridement for biofilm removal along with routine supportive therapy is considered as the prime preventive strategy for effective management and prevention of periimplant mucositis and its further progress to periimplantitis.

Keywords: Mucositis, Periimplant mucositis, Periimplant soft tissue, Biofilm, Periimplant tissue management.

Introduction

The soft and hard tissues that occur around an Osseo integrated implants are called as periimplant tissues. The soft tissue area present around an implant is called as periimplant mucosa which is formed during the time of wound healing after the placement of implants.^[1]

The inflammation of these soft and hard tissues is termed as “periimplant mucositis” and periimplantitis respectively. Periimplant mucositis and periimplantitis were first described and defined in 1993 at the First European Workshop on Periodontology in Iftingen. Periimplant mucositis considered to be the precursor of periimplantitis. Periimplant mucositis has been defined as an inflammatory lesion of the mucosa surrounding an end osseous implant without loss of supporting periimplant bone. ^[2,3,4] Clinical signs and symptoms of periimplant mucositis includes gingival inflammation with pain, redness, swelling and bleeding on probing.^[5]

Role of Periimplant Tissues

The main functions of the soft tissue component or the periimplant mucosa is to protect the underlying bone (hard tissue component) that supports the implant. The destruction of these periimplant tissues can jeopardize the success and survival of implants.^[6]

Clinically Healthy Periimplant Tissues

The oral environment as well as the microorganisms in the teeth and the implant surfaces possesses a consistent challenge to the periimplant mucosa.^[7,8-13] There will be a continuous cellular and vascular host response in the clinically healthy periimplant mucosa. Thus, different vascular structures occur in the connective tissue lateral to epithelium as well as small clusters of T and B lymphocytes.^[1] Polymorph nuclear leucocytes seems to be present in the connective tissue immediately lateral to the epithelium and at the same time macrophages are seen along the entire interface zone.^[8] In healthy periimplant mucosal conditions, a soft tissue seal is formed by the barrier epithelium and the scattered inflammatory cells that separates the periimplant attachment from the oral cavity.^[10,11,12,14,15] The accumulation of bacterial biofilm around an osseointegrated implant results in the conversion of healthy periimplant mucosa to periimplant mucositis. This was proved by the cause and effect relationship study conducted in the year 2001.^[13,16,17,18]

Risk Indicators and Factors for Periimplant Mucositis

The risk indicators and factors of periimplant mucositis can be classified into two categories. They are general risk indicators and factors and local risk indicators and factors. The below table shows the classification of general and local risk indicators or factors:

General Risk Indicators or Factors	Local Risk Indicators or Factors
<ul style="list-style-type: none"> ➤ Cigarette smoking.^[19,20,21] ➤ Radiation.^[19] ➤ Poorly controlled diabetes mellitus.^[22] ➤ Increased time of loading of implant.^[23] ➤ Hormonal changes.^[24] ➤ Chemotherapy.^[24] ➤ Menopause.^[24] ➤ Cardiac problem.^[24] ➤ Alcohol use.^[24] 	<ul style="list-style-type: none"> ➤ Biofilm accumulation.^[25,26,27] ➤ Lack of compliance with Supportive Implant Therapy SIT.^[28] ➤ Materials and surface characteristics of implant components.^[29,30] ➤ Design of implant supported Prosthesis.^[31,32,33] ➤ Dimensions of keratinized Periimplant mucosa.^[34,35,36,37,38,39] ➤ Excess cement.^[40,41,42]

Management of Periimplant Mucositis

As per CIST protocol (Mombelli and Lang et al 1998) and AKUT protocol (Lang et al 2004), if the probing depth is less than or equal to 3mm and there is presence of plaque and bleeding on probing, then mechanical debridement and polishing is required. Periimplant mucositis can be treated either by professional intervention or by home use oral hygiene techniques. Mechanical debridement along with or without adjunct antimicrobial therapy are considered as effective measures in controlling and removing the biofilm and calculus around dental implants.

Professional interventions

Mechanical debridement along with or without antimicrobial therapy is used by the clinicians in order to remove the biofilm and calculus around the periimplant surface thereby restoring a healthy periimplant mucosa^[43]. Various aids used for mechanical debridement include the use of currettes and ultrasonic devices containing polyether ether ketene coated tips. Currettes like titanium coated currettes^[43], carbon fiber currettes^[44], Teflon currettes^[45], plastic currettes^[46] are used for periimplant surface debridement. Ultrasonic device with polyether-ether ketone tips are made of high-quality plastic material and stainless-steel core and are effective in debriding the periimplant surface.

Adjunct antimicrobials include antiseptics and locally and systemically delivered antibiotics. Chlorhexidine under various combinations are effective antiseptic agent for use

along with mechanical debridement. Mouth rinsing with 10 ml of 0.12 % Chlorhexidine and brushing with 0.12% Chlorhexidine gel, twice daily for 10 days after treatment is effective.^[46] Locally delivered antibiotics are also effective in which we can use monolithic ethylene vinyl acetate fibers containing 25% tetracycline hydrochloride. These fibers were placed around the implant surface in circular pattern and stabilized in place using isobutyl cyanoacrylate adhesive and the fibers were removed after 10 days.^[47] Systemic antibiotics were also used along with mechanical debridement like azithromycin 500 mg/day for 4 days.^[43]

Home use oral hygiene interventions

It includes mechanical plaque control and chemical plaque control. Mechanical plaque control can be attained by the use of manual or powered tooth brushes and interproximal cleaning aids. We can use powered tooth brush twice daily for 30 s for a period of 6 weeks after professional mechanical debridement of the peri-implant surface.^[48] Soft manual toothbrush and dental floss, specialized implant dental floss, counter rotational powered tooth brush, manual squish grip brush are different cleaning aids used for home use oral hygiene practices. This can be used in conjunction with chemical plaque control agents for example the use of Chlorhexidine mouth wash along with counter rotational powered tooth brush is proved to be effective in preventing and controlling the biofilm around the periimplant surfaces.^[49]

Case Report

A 34-years-old female patient came to the department of implantology with the chief complaint of pain and swelling in relation to lower left back teeth region since one week. Patient had no relevant medical history and no drug allergies. The patient had history of implant placement in the lower right first molar region before three months. She also underwent placement of gingival former (healing abutment) two weeks ago. The intra oral examination

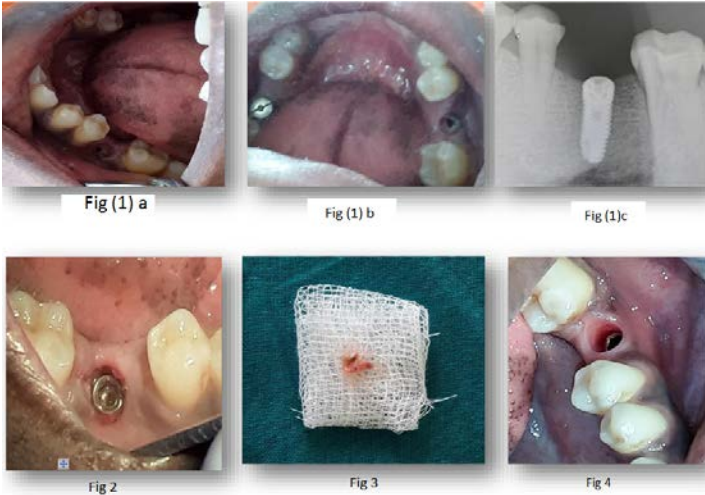
revealed pain and swelling of the peri implant soft tissues around the gingival former. Pain was of throbbing type and continuous in nature and it aggravates while chewing food and during teeth brushing. On palpation pus discharge was noted in relation to lower left first molar region around the healing abutment. The periimplant soft tissues appeared mild erythematous in nature with white band of mucosal tissue circumscribing the healing abutment. Bleeding on probing and probing depth of about 3-4 mm was also noted in relation to lower left first molar region. [fig (1) a, b]

A comprehensive periodontal examination revealed presence of heavy calculus deposits in relation to lingual surface of mandibular and maxillary posterior teeth region showing poor oral hygiene maintenance by the patient. Plaque index score was greater than 1 Intra oral periapical radiograph showed crustal bone loss at the most coronal part of the implant in relation to lower left first molar region that occurred as a part of biologic remodeling.(Fig (1)c) Based on the comprehensive clinical and radiographic evaluation, a provisional diagnosis of peri implant mucositis was made.

Treatment

Management of peri implant infections include non-surgical and surgical therapy. Mild forms of peri implant mucositis can be often treated by non-surgical therapy alone. The case presented here has a sulcus depth of about 3-4mm, bleeding on probing positive, so based on the concept of CIST protocol and AKUT protocol, mechanical debridement and polishing were done followed by thorough irrigation using povidone iodine (7.5%). We planned for an excisional biopsy of the inflamed peri implant mucosal tissue for histopathological confirmation. [Fig 2]. Excisional biopsy of the periimplant mucosal tissue (0.9*0.3*0.2 cm) was done under local anesthesia (lignocaine hydrochloride 2%, Lignox), and the excised tissue [Fig 3] was sent for histopathological examination. The healing abutment was

replaced with a torque of 15 N cm. The patient was kept under antibiotics and antimicrobial therapy for one week. Post operatively, the color of the tissue seems to be normal without any sign of inflammation and bleeding on probing suggestive of healthy periimplant mucosa. [Fig 4]



Histopathologic Examination Of Excised Tissue

Histopathological examination of the given soft tissue section revealed connective tissue exhibiting peripheral area of necrosis with associated intense infiltration of mixed inflammatory cells, predominantly lymphocytes [Fig 6]. Areas showing dense fibrosis with abundant collagen fibres and a small bit of stratified squamous surface epithelium are also noted [Fig 5]. Based on the histopathological and clinical findings, we arrive at the confirmatory diagnosis as peri-implant mucositis.

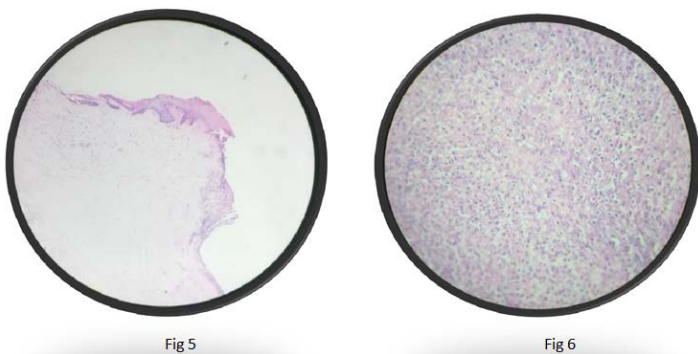


Fig 5 :- Histopathologic view of the lesion showing stratified squamous epithelium and connective tissue with associated intense infiltration of mixed inflammatory cells,

predominantly lymphocytes (hematoxylin and eosin stain, original magnification x10).

Fig 6 :- Higher magnification showing connective tissue exhibiting peripheral area of necrosis with associated intense infiltration of mixed inflammatory cells, predominantly lymphocytes and dense fibrosis with abundant collagen fibres (hematoxylin and eosin stain, original magnification x40).

Conclusion

Periimplant mucositis is characterized by inflammation of the mucosa without any loss of marginal bone. Factors associated with periimplant mucositis includes accumulation of plaque and calculus, radiation therapy, smoking etc. Regular Supportive Periimplant Therapy with removal of biofilm is the most important preventional strategy against the progress of healthy periimplant mucosa to periimplant mucositis as well as from periimplant mucositis to periimplantitis.

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