



## SURGICAL MANAGEMENT OF PERI-IMPLANTITIS USING PRF AN INTERDISCIPLINARY APPROACH

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### ABSTRACT

**Background:** Peri-implantitis is an irreversible disease of implant-surrounding hard and soft tissues and is accompanied with bone resorption. The presence of periodontitis or cigarette smoking increased the risk for peri-implantitis. A 23-year-old female patient visited Department of Periodontics, with the chief complaint of exposed implant surface with respect to left upper front tooth region. On eliciting personal history, the patient reported that, she got her front tooth extracted due to trauma 3 years back. After 6 months patient got her tooth replaced by an implant.

Intraorally gingiva was pale pink in color with patches of melanin pigmentation around the implant surface in the left upper central incisor region. Marginal gingiva was rolled out with loss of normal gingival scalloping. On palpation, gingiva was soft and oedematous in consistency. The probing elicited bleeding and a pocket depth of 6mm around the implant with the exposure of an implant abutment around 3mm. Radiographic examination showed the presence of horizontal bone loss on either side of the implant. Based on the patient's clinical features and radiographic evaluation, a diagnosis of peri-implantitis was made.

**Treatment:** The patient was treated initially by nonsurgical approach, mechanical debridement of the implant surface with plastic-curettes was carried out. After a week a mucoperiosteal flap was raised, sulcular incision was given from 11 to 23 along with vertical incision extending from mesial line angle of the 23. After thorough mechanical debridement, prepared PRF was incorporated into the defect area, flap was closed with continuous interlocking sutures and postoperative instructions were given. After 2 weeks of satisfactory healing, patient was referred to Department of Prosthodontics for the new prosthetic replacement.

**Conclusion:** Conventional surgical approach of managing peri-implantitis with the placement of PRF for periodontal soft and hard tissue augmentation was successful with uneventful healing.

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### INTRODUCTION

Peri-implantitis is a progressive and irreversible disease of implant-surrounding hard and soft tissues and is accompanied with bone resorption, decreased osseointegration, increased pocket formation and purulence.<sup>1</sup> At the 1st European Workshop on Periodontology in 1993 it was agreed that this term should be used specifically for destructive inflammatory processes around osseointegrated oral implants in function that lead to peri-implant pocket formation and loss of supporting bone.<sup>2</sup>

The incidence of peri-implantitis was found to be between 28% and 56% reported by Lindhe & Meyle. The presence of periodontitis or cigarette smoking increased the risk for peri-implantitis up to 4.7-fold as reported by Walloway et al.

In a recent meta-analysis smoking increased the annual rate of bone loss by 0.16 mm/year. According to Vervaeke et al. maxillary implants were at a significantly higher risk for peri-implant bone loss compared to mandibular implants. However, age or gender had no play in implant failure.<sup>3</sup> However managing peri implantitis challenging, as there are several treatment modalities of which will be selected according to the severity of the peri implant disease.

The treatment of peri-implant infections comprises of conservative (non-surgical) and surgical approaches. The nonsurgical approach includes mechanical debridement of implant surface with titanium or plastic-curettes, ultrasonics or air polishing. The surgical therapy combines the concepts of the already mentioned non-surgical therapy with those of resective and/or regenerative procedures. Photodynamic therapy as well as antimicrobial therapy with chlorhexidine gluconate, hydrogen peroxide, sodium percarbonate, povidone-

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iodine etc are the other treatment approaches. Adequate oral hygiene measures are considered as key issue for the prevention of further peri-implant infections.<sup>4</sup>

The most common grafts used today are autografts, allografts, demineralized bone matrix, xenograft (bovine), and substitute bone grafts (calcium sulfate, calcium phosphate and HA).

To determine which graft is most appropriate for a given condition, an understanding of the biological function (osteogenesis, osteoinduction, and osteoconduction) of each graft is necessary.<sup>5</sup>

Autogenous bone grafts remain the gold standard for bone regeneration. They have a major advantage in that they supply not only bone volume but also osteogenic cells, which are capable of quickly laying down new bone. However, they also have various drawbacks, including increased patient morbidity, limited bone graft availability, and additional surgical time/costs.<sup>12</sup> Despite their drawbacks, autogenous bone grafts remain the gold standard to which every substitute must be compared.<sup>6</sup>

Platelet-rich fibrin (PRF) is a second-generation autologous platelet concentrates, which enhances both soft and hard tissue healing. PRF is the activated form of a plasmatic molecule called fibrinogen. The fibrin formed after the centrifugation is changed into biologic glue which consolidates the initial platelet cluster. The fibrin architecture entraps various numbers of leukocytes in the fibrin matrix, allowing an intense slow release of growth factors, and favors the sealing of wound borders and facilitates rapid epithelialization.<sup>7,8</sup> PRF has the following advantages as it is simple to prepare, accelerates the healing rate of the grafted bone when combined with other grafts. The natural fibrin framework with growth factors within imparts prolonged activity that stimulates tissue regeneration effectively. It prevents addition of external thrombin as polymerization is a completely natural process, thus refraining from the risk of immunological reaction. When PRF is used along with bony grafts, it is a quick as well as an economical alternative when compared with recombinant growth factors.<sup>9</sup>

A recent systematic review by Miron *et al* has proven the potential of PRF on wound healing after regenerative therapy for the management of various soft-tissue defects.<sup>10</sup>

A study conducted by Bolukbasi N *et al* have demonstrated that PRF as a healing biomaterial with a great potential for bone and soft tissue regeneration, without inflammatory reactions around an implantand may be used alone or in combination with bone grafts, promoting hemostasis, bone growth, and maturation.<sup>11</sup>

The autologous matrix demonstrated a great potential to increase cell attachment and a stimulation to proliferate and differentiate osteoblasts around an implant, in an *in vitro* study conducted by Dohan Ehrenfest DM *et al* in 2009.<sup>12</sup>

This present case report discusses a case of peri- implantitis and its management with platelet rich fibrin.

## CASE REPORT

A 23-year-old female patient visited Department of Periodontics, with the chief complaint of exposed implant surface with respect to left upper front tooth region and the patient also was concerned about unpleasing appearance. On

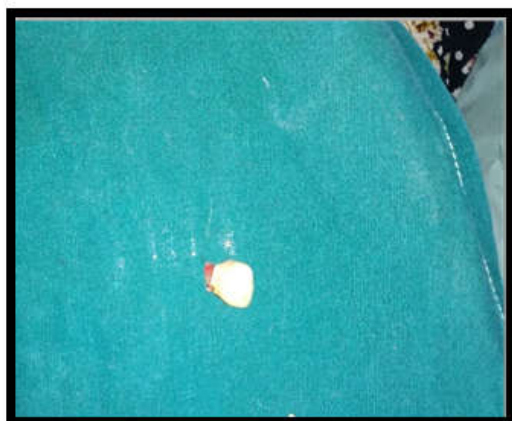
taking a detailed case history, the patient reported that, she got her front tooth extracted due to trauma 3 years back when she met with an accident. After 6 months patient got the missing tooth replaced by an implant.

On intraoral examination, gingiva was pale pink in color with patches of melanin pigmentation around the implant surface in the left upper central incisor region. Marginal gingiva was rolled out with loss of normal gingival scalloping. On palpation, gingiva was soft and oedematous in consistency. The probing elicited bleeding and a pocket depth of 6mm around the implant with the exposure of an implant abutment around 3mm. Radiographic examination showed the presence of horizontal bone loss on either side of the implant extending up to the middle third of the implant. The bone loss extended to the adjacent teeth on buccal aspect only. Based on the patient's clinical features and radiographic evaluation, a diagnosis of peri-implantitis was made.



In this present case the patient was treated initially by nonsurgical approach, mechanical debridement of the implant surface with plastic-curettes. After a week a mucoperiosteal flap was raised extending to mucogingival junction to expose the implant. Sulcular incision was given from 11 to 23 along with vertical incision extending from mesial line angle of the 23.





The crown and abutment of an implant was removed to mill the abutment, to achieve patient's exact gingival architecture and a more esthetically pleasing outcome, following which both were placed back to the previous position.

Mechanical debridement was carried out on and around the implant surface using plastic-curettes after elevating the mucoperiosteal flap, only on the buccal aspect only. During the procedure, 10ml of blood was drawn from the patient by venipuncture of the antecubital vein and collected in a sterile glass test tube without any anticoagulant. The tubes were immediately centrifuged at 1,600 rpm for 8 minutes using a centrifuge machine, at room temperature. After centrifugation, the PRF clots were removed from the tubes using sterile tweezers and the prepared PRF was incorporated into the defect area. The defect was extending, approximately 3 to 4 mm of the implant abutment on buccal aspect with bone loss observed on the adjacent teeth also. After thorough mechanical debridement, mucoperiosteal flap was sutured with continuous interlocking sutures by slightly advancing the flap coronally to

cover the exposed implant and postoperative instructions were given.



After 2 weeks of satisfactory healing, patient was referred to Department of Prosthodontics for the new prosthetic replacement, as an esthetically pleasing gingival architecture was not been able to achieve with the older crown. Transfer coping was placed to the implant, after which an open tray impression was obtained. Followed by jig trial and bisque trial, the final crown was placed.



Transfer coping

Open tray impression Jig trial



5 months post op

## DISCUSSION

It is challenging to treat peri-implantitis as it is of multifactorial etiology, which includes complex treatment procedure. Depending on the nature of the disease, treatment can vary significantly from non-surgical therapy with an aim to control the infection and detoxify the implant surface, to surgical procedures to regenerate the alveolar bone that has been lost.

Due to the screw-shaped design and titanium surface modifications of the implants, mechanical debridement on the surface of the implant is ineffective in removing all adhering microorganisms. Therefore, to enhance the non-surgical



treatment options of peri-implantitis, mechanical debridement can be used in combination with antiseptic, antibiotic therapy and/or resective or regenerative surgery. The combination of treatments can vary depending on the severity of the peri-implantitis, and cumulative interceptive support therapy provides guidance in this aspect.<sup>13</sup>

Cumulative interceptive supportive therapy, a protocol of therapeutic measures, provides guidance for clinicians to decide which regime should be used to treat peri-implantitis, depending on the mucosal condition whether there is a presence of dental plaque, bleeding on gentle probing, suppuration, peri-implant probing depth and evidence of radiographic bone loss.<sup>14</sup> This present case required Protocol D (regenerative or resective therapy), only if infection is controlled successfully by A,B and C as evidenced by an absence of suppuration and reduced edema. It aimed to restore the bony support of the implant by means of regenerative techniques. Considering the prognosis of the case, risk-benefit ratio, regenerative periodontal therapy was performed.

The regenerative surgical procedure makes use of most common grafts like autografts, allografts, demineralized bone matrix, xenograft (bovine), and substitute bone grafts (calcium sulfate, calcium phosphate and HA).

However, the use of bone grafts has also been encountered with the following disadvantages. The study conducted by Yildirim M *et al*, concluded the use of xenograft bone substitutes demonstrated slower rate of integration.<sup>15</sup> Use of calcium sulfate demonstrated faster resorption and the persistence of redness, swelling of the wound after the procedures which was reported by Buckland T *et al*.<sup>16</sup> Since Bone allograft is most often preserved by a freeze-drying process and vacuum-packing, mechanical property of bone allograft weakens and living osteogenic cells are removed in the process of sterilization and storage as reported by Zhang Y *et al*.<sup>17</sup>

Though autografts also have various drawbacks like limited bone graft availability and requirement of a second surgical site, which makes the procedure more invasive, they still remain the gold standard for both soft and hard tissue regeneration.

However, Platelet-rich fibrin contains many growth factors, including the PDGF, TGF- $\beta$ , IGF, EGF, fibroblast growth factor, and bone morphogenic protein. These growth factors play a central role in hemostasis, angiogenesis, osteoblastic proliferation and differentiation which makes PRF advantageous. PRF allows a significant postoperative protection of the surgical site and seems to accelerate the integration, maturation, and remodeling, while enhancing bone graft density.<sup>7,8</sup>

Considering the patients esthetic concern and higher success rate with application of PRF in the treatment of peri-implantitis, the above-mentioned technique was adopted. PRF filled up the horizontal defect area on the left upper central incisor region, which ensured satisfactory results with uneventful healing. The regenerative procedure has a predictable approach even in the presence of advanced bone loss. Our results findings were similar to the clinical and radiographic findings observed by Yilmaz *et al* where EMP was used to treat horizontal defects.<sup>18</sup>

## CONCLUSION

Thus, we can conclude that conventional surgical approach of managing peri-implantitis with the placement of PRF for periodontal soft and hard tissue augmentation can be one of the treatment options. In this present case reportsatisfactory improvement was observed, as there was reduction in the inflammation, decrease in probing depth with appreciable bone fill. The outcome of the procedure was successful with uneventful healing.

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