Autologous Platelet Rich Plasma around Dental Implant for Rehabilitation of Combination Syndrome: Clinical Report

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Abstract: A group of destructive changes may be encountered in constructing a single maxillary denture against mandibular teeth that is called a combination syndrome (CS). Recently the use of implants has a great impact on the prosthodontic treatment of the edentulous patient. The clinical case report was treated with a modern variation to the conventional clinical scenario. Most of attachment system for implant overdenture suffer from wear during insertion and removal as well as under functional load. The use of fewer implants in removable prosthesis provided the least patient satisfaction than the fixed prosthesis. The multidisciplinary approach of dental implant with various appropriate attachment design is necessary for CS patient and available management strategy should be applied to suit the need of the patient for rehabilitation either maxillary or mandibular arch with fixed prosthesis.
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Key words: Diagnosis, Implant Prostheses, Combination syndrome.

1. Introduction

Some patients can be treated by single maxillary or mandibular complete denture if they become edentulous in one arch while retaining some or all of his natural teeth in the opposing arch. A group of destructive changes may be encountered in constructing a single maxillary denture against mandibular teeth that is called a combination syndrome (1). The main problem is the qualitative and quantitative differences between natural tooth and complete denture support: the natural dentition but not the mucoperiosteal bone is capable of specialized responses to occlusal demands that preserve its function. Bone will respond in a different way depending on age, sex and ethinity. The combination syndrome (CS) was characterized by loss of bone from maxillary anterior ridge, dense growth of the maxillary tuberosities, papillary hyperplasia of the tissues of the hard palate and extension of the lower anterior teeth and loss of bone beneath the RPD bases. (2)

Recently the use of implants has a great impact on the prosthodontic treatment of the edentulous patient. The main principle of any prosthetic treatment was based on the reduction of the transmitted load to the supporting structures. The prosthesis is supported by implant and mucosa requires a smaller number of implants when compared with the totally implant supported prosthesis design. (3,4).

There are many different attachments provided by a large number of manufacturers around the world. Most of these are compatible with the majority of the implant systems currently available and are divided into two major categories: bar and stud attachments. The choice of attachment is based basically on opinions and clinical experience rather than on real evidence and scientific findings (5). Factors of selection attachment systems depend on the amount of space available, maintenance requirements, load distribution to the mucosa and to the implants, and the degree of retention. The O-ring is perhaps the most popular stud attachment which is available to the dental profession to increase the retention of implant supported overdentures. O-rings are elastomeric retentive attachments which are usually made of silicon and shaped like the inner tube of a tire. They are held within metallic retaining rings with undercut groove. The retaining rings are embedded within the denture base resin during the laboratory procedure or chair side with auto-polymerizing resin (6, 7).

Fixed prostheses were supported by more implants than for overdenture retention. Thus the design of the head of the implant fixture and of the fixture/abutment interfaces seems to play role in reducing bending forces on the abutments, copies and retaining screws. (8). Therefore, in many cases the indication for fixed prostheses will be limited due to inadequate structure of the bone, unless additional surgical procedures such as bone augmentation by graft procedures are used. This is particularly true for the maxilla (9). Platelet gel was used successfully in many surgical fields, it has several advantages as

enhancement and acceleration of bone regeneration with more rapid and predictable soft tissue healing. The acceleration of soft tissue healing is promoted by rapid revasularization and re-epilitheliazation of flaps and cell proliferation. (10, 11).

The mutual objective of the clinician and patient is to restore the missing dentition with a fixed restoration that exhibits better longevity (12). Implant Placements can be used in rehabilitating a completely edentulous maxilla using implants supported fixed ceramo-metal prosthesis, implant supported overdenture or an implant and tissue supported overdenture. (13,14).

This clinical case report highlights toward the development of innovative multi-disciplinary approach of surgical and prosthetic techniques to treat Combination Syndrome (CS) in an attempt to overcome future problems similar to those described by Kelly.

2. Material and Methods

A 58 years old woman presented for recall visit in the Prosthodontics clinic complaining of edentulous maxillary edentulous arch opposed with mandibular class I kennedy`s classification, supported by old loose fixed bridge and carious, periodontal compromised remaining teeth (Fig. I). A complete case history and a careful clinical examination revealed that the patient had complete maxillary denture but could not wear it because it was "too big and unstable. She was not satisfied neither functionally nor aesthetically". The main complaints were the poor stability and fit seeking for a solution for her problem. Finally, she came to our clinic to make a new prosthesis. Routine laboratory and medical investigations were performed for the patients undergoing implant surgery.

Fig. 1: Edentulous maxilla and partially edentulous mandibulararch before treatment plan.

Treatment plan:

The study design was explained to the patient and consent form was obtained. Initial treatment planning began with mounted study casts and panoramic radiograph. The mounted diagnostic cast was duplicated and diagnostic wax-up was fabricated to identify the ideal implants position.

New heat cure acrylic resin (Acrostone Co, England) maxillary complete denture and mandibular removable partial denture were constructed using conventional standard technique (15) that allow the aesthetic and functional rehabilitation.

Clear acrylic surgical guide stent was fabricated from Prefabricated complete denture. The patient received six endosseous titanium implant (3.5mm. diameter and 10 and 11mm.length) in the maxillary arch (Endure^{TM} CL, IMTEC Corporation, USA) two in the anterior area and two at premolar area in both right and left (Fig 2).

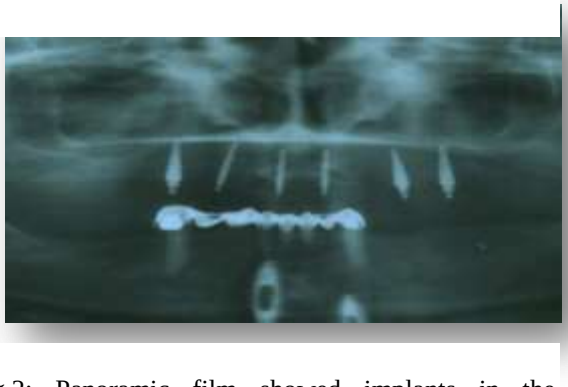


Fig.2: Panoramic film showed implants in the maxillary arch.

PRP preparation:

Platelets rich plasma gel was prepared half an hour before surgery by drawing 9ml of venous blood from patient, placed in 10 ml tube with 1ml citrate solution. After centrifugation of the blood in tube,7 parts of PRP was mixed with one part of calcified thrombin (prepared by dissolving 5000 units of thrombin (Jones pharmaincorporated U.S) in 5cc of 10% calcium chloride (Dade Behring Co., Germany) to produce viscous coaglum gel used as surgical graft material (16,17).

Implant placement and prosthetic procedure of the maxillary arch (Fig. 3):

Implant insertion was performed under local anesthesia. Bilateral infra-orbital and posterior superior alveolar nerve block on the buccal side, nasopalatine and bilateral greater palatine nerve block on the palatal side in the maxilla for implant placement were used. Clear surgical stent was used to assist in positioning the implant fixture in the proper location and alignment. All the steps of implant placement were achieved according to the manufacturer's instructions. The surgical procedure was done at two steps. Firstly, surgical mucoperiosteal

flap was done for placement of the implant fixture at the prepared site after coated with PRP gel. The cover screw was secured to the implant. The mucoperiosteal flap was repositioned and continuous sutures were used for thewhole ridge. The patients were not allowed to wear their denture for the first two postoperative weeks. The patient was instructed for eating soft diet and antibiotic and anti-inflammatory drugs were prescribed. On the seventh day of the operation, the sutures were removed and the operation area was cleaned with chlorohexidine solution and saline. After two weeks, the conventional maxillary denture was used and relined with soft lining material, with the appropriate thickness to ensure adequate relief over the implant tissues. The patient was allowed to use her denture. Clinical and radiographic (panoramic and periapical radiographs) evaluations were performed to ensure implant integration.

The second-stage surgery was performedfour months after healing. The implants were uncovered using tissue punch for exposing the cover screw. The cover screw was removed and the superstructures were attached to implant (they consist of O-rings, keeper and ball insert attachment). Relief was accomplished in the maxillary denture base (with horse shoe plate) over the implant abutment to allow passive fit over the attachment housing. The O-ring keyway attachment was bonded to the denture base with auto-polymerizing acrylic resin (Acrostone, Co, England) inside the patient's mouth with guiding the patient to close in centric occlusion until polymerization of the acrylic resin. An elastic shim (spacer) was placed around the O-ring assembly on the implant in the mouth to protect the gingiva from acrylic resin seeping into the mucosa and prevent acrylic resin from adhering to the implant. The orientation of the attachment inside the denture base was examined (Fig 4). Smoothing and polishing the surface of the denture base were carried out and then occlusal equilibration with mandibular RPD was completed.

Fig.3: Clinical postoperative view of maxillary implants.

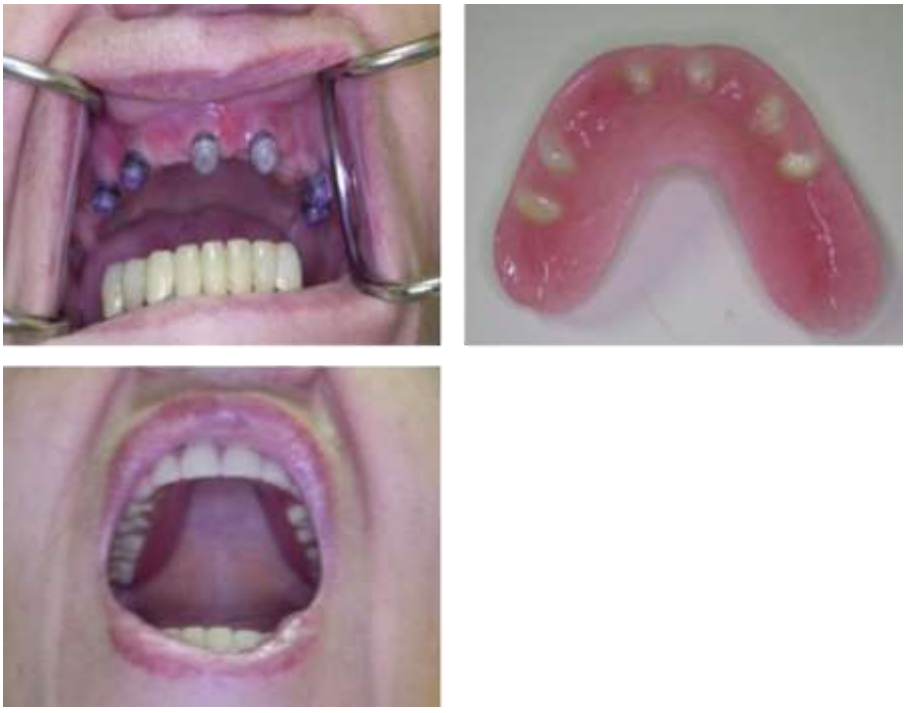


Fig.4: Maxillary implant overdenture.

Implant placement and prosthetic procedure of the mandibulararch:

Two months later after finishing and wearing the maxillary implant supported overdenture, the loose mandibular fixed bridge was removed and overall impression of the mandibular arch with the removable partial denture was made to fabricate an immediate complete mandibular denture. Clear heat cure acrylic resin surgical guide stent was constructed from prefabricated mandibular complete denture. Seven endosseous titanium implants were placed in the mandibular arch area after bilateral inferior alveolar and lingual nerve block anesthesia. Mucoperiosteal flap extended from the first molar area to the distal canine bilateral. Surgical guide stent aided in positioning the implants in the proper location. Implants were coated by PRP gel and then inserted into the pilot opening, then cover screw was secured to the implant and the Mucoperiosteal flap was repositioned with continuous suture on the whole ridge. The sutures were removed two week spostsurgically and the conventional denture was used and relined with soft lining material. After five months of healing, the mandibular preparable abutments were placed on implant fixture and poly-vinyl siloxan final impression (Exafineinjection, GC corporation, Tokyo, Japan) of the mandibular arch was made and sent to the laboratory for final preparation and fabrication of mandibular fixed porcelain fused to metal bridges (Fig.5), (i.e. the fixed mandibular prosthesis was constructed in three section) and cemented by permanent cement (Panavia F2.0, Kuraray Dental, Japan).

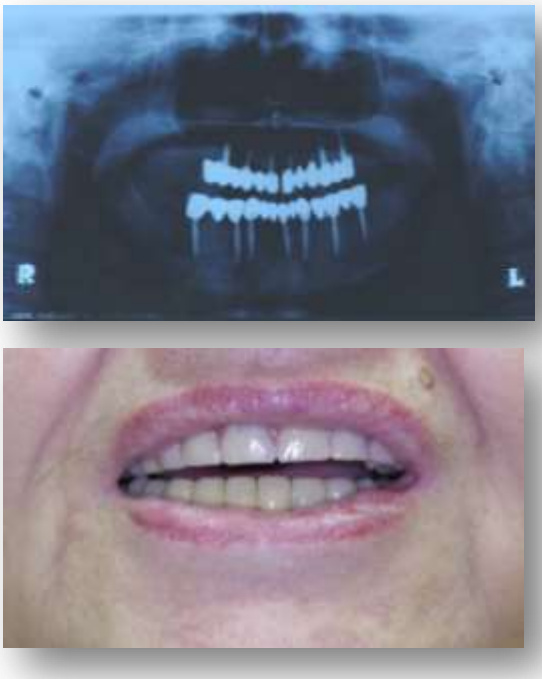
Fig.5: Fixed cemented mandibular prosthesis.

The occlusion with the maxillary complete denture was adjusted.

Articulating paper was used for occlusal adjustment in centric and lateral excursions. The patient was instructed for oral and denture hygiene. The patient was followed up one week post-insertion.

The patient wore the implant supported horse shoe maxillaryoverdenture for six months and the mandibular implant supported fixed bridge. She was satisfied with the mandibular implants supported fixed prostheses but she was not satisfied with the removable prosthesis and shepreferred non removable prosthesis if possible. The treatment option was discussed with the patient for the fixed bridge.

The maxillary implant supported overdenture was converted into fixed restoration by interchangeable prosthetic part. The O-ring ball attachment was replaced by prepableabutment in the six implant fixture. The abutments were prepared with high speed diamonds and water coolant. A polyvinyl siloxane impression (Exafineinjection, GC corporation, Tokyo, Japan), face bow registration, bite registration and opposing impression was taken and sent to the laboratory for construction of two units fixed porcelain fused to metal bridges. The bridges were cemented to implant abutments with permanent cement (Panavia F2.0, Kuraray Dental, Japan).(Fig.6).



(Fig.6): Final prosthesis in situ

Finally panoramic and periapical films were taken for evaluation. The occlusion, oral hygiene and soft tissue were re-evaluated two weeks after insertion.

4. Discussion

Combination Syndrome (CS) is an occlusal problem that slowly develops over time. The choice of treatment modality of CS depends on the patient, amount of money that the patient is willing to spend for the treatment, the oral condition and the desire for

fixed or removable prosthesis. (18,19,20). Although a traditional treatment with a complete maxillary denture and distal extension mandibular partial denture is still common, osseointegrated implant-supported or retained treatment has become more prevalent and has physiologic indications in CS cases. The implant fixed prosthesis is preferable to the removable option. A surgical and prosthetic rehabilitation of this patient with dental implants prosthesis may control the deteriorating effects of CS. (21). Most of attachment system for implant overdenture suffer from wear during insertion and removal as well as under functionalload.

The restoration supported by multiple implants perform better as compared with those supported by fewer implants. (22) Implant fixed prosthesis improve the biting force and slow down the bone resorption. (23, 24).

This case study deals with treatment of Combination Syndrome by conversion of the removable prosthesis which provide the least patient satisfaction to the fixed prosthesis. The patient was instructed for regular visits every two weeks and then one month for check the hard and soft tissue around the implant and the oral tissues to avoid the problem of CS.

We concluded that the multidisciplinary approach of dental implant with various appropriate attachment design is necessary for CS patient and available management strategy should be applied to suit the need of the patient for rehabilitation either maxillary or mandibular arch with fixed prosthesis.

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