Implant supported prosthesis with guided bone regeneration and indirect sinus augmentation procedure: A case report.

Vishal Paul[1], Rahul Naghrath[2], Manesh Lahori[3].

[1]PG student, Department of prosthodontics, K.D. Dental college and hospital, Mathura.
[2]Professor, Department of prosthodontics, K.D. Dental college and hospital, Mathura.
[3]Professor and Head, Department of prosthodontics, K.D. Dental college and hospital, Mathura.

Abstract

Introduction: Guided Bone Regeneration (GBR) approach aims to regenerate osseous defects predictably by enabling osteogenic cell populations originating from the parent bone to occupy the osseous wound. In implant therapy, there are two ways to use GBR: simultaneously during implant insertion (simultaneous approach) and stagedly beforehand to heighten the alveolar ridge or improve ridge morphology. Subantral augmentation, was created to add more bone to the posterior maxilla. Indirect sinus augmentation procedure involves the direct manipulation of the Schneiderian membrane by using round end drills of proper diameter.

Case description: A male patient wanted to rehabilitate the upper posterior tooth in both the quadrants and complete lower arch. The patient opted for fixed dental therapy. The plausible causes and precautions were explained to the patients and a cone beam computerized tomography (CBCT) was advised. Hematological examinations were done. Keeping the bone dimensions in consideration fixed implant prosthesis was planned and executed. Immediate extractions were planned in the lower arch and subsequent implant placement was done.

Discussion: Edentulous maxilla with inadequate spongy bone and D3-D4 density bone around maxillary sinus region are handled with direct or indirect sinus augmentation procedure in combination with GBR around the placed implants. In the present case indirect sinus augmentation was approached keeping in mind around 6-8mm residual alveolar bone in the sinus regions.

Keywords: Barrier membrane, Guided bone regeneration, Immediate implants, Indirect sinus augmentation, Surgical guides.

Address of correspondence: Dr. Vishal Paul, K.D. Dental college and Hospital, National Highway #2, P.O. – Chhatikara, Mathura- 281006 (U.P.)
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Introduction

Contemporary dentistry deals with the rehabilitation of edentulous sites with implant therapy. Adequate alveolar ridge dimensions along with vital structures surrounding them becomes pre-requisite for successful implant placement. This is followed by proper healing process of 5-6 weeks with formation of clot to bone growth and regeneration around the implant sites. These sites are then covered with connective tissue and epithelium.[1,2]

Platelet-rich fibrin (PRF) is a homologized blood formed derivative which forms platelet rich fibrin network after subsequent centrifugation process. This fibrin networks along with certain growth factors helps with new bone growth. The sole purpose of the presented case is to manage PRF in combination of synthetic bone biomaterials for guided bone regeneration round implants placed in maxilla.[3] The presented case availed us with Residual Alveolar Bone height of 6-8 mm, which helped with the indirect sinus augmentation procedure. Particular small round ended drills were used to perform the procedure under local anaesthesia.[4]

Case report

A male patient (65 years) visited the department of prosthodontics, K.D. Dental College and Hospital to rehabilitate the upper posterior tooth in both the quadrants and complete lower arch (Figure1). Diagnostic impressions were made using irreversible hydrocolloid impression material and casts were poured. Upper and lower removable partial denture was fabricated and placed in patient's mouth. Patient was instructed to wear an interim removable prosthesis for 3 weeks.

CBCT was done and adequate bone levels were determined. Subsequently implant diameter and lengths were determined and indirect sinus augmentation procedure for maxillary posterior region was planned. Patient was recalled and previous dentures were used as surgical guides (Figure 2). Lower premolars were extracted and immediate implant placement were planned. Hence keeping the dimensions in view, the implant selected for the purpose of rehab was ADIN TOURAEG OS of size: Four implants of dimension (4.2x8, 4.2x8, 4.2x8, 4.2x10) were used for maxillary posteriors and seven implants of dimensions (5.0x8, 4.2x10, 4.2x10, 3.75x11.5, 3.75x11.5, 3.5x11.5, 3.5x11.5) were used for mandibular arch.

Surgical intervention

Patient's blood was obtained from the median basilica vein (2 tubes of 100 ml each) and centrifuged at a 2700 rpm technique for 15 minutes to withdraw the PRF. This was further used along with synthetic bone grafts around implants for new bone regeneration (Figure 3). Infiltrative local anesthetic was performed with 1: 100,000 Articaine tubes (Septanest) for the greater palatine foramen and infraorbital region and same tubes for the nasopalatine foramen and palatal area. Similarly in the lower inferior alveolar region. Full thickness mucoperiosteal flap was elevated after a remote incision from the implant site and crevicular incision with regard to the neighboring tooth, once enough local anesthesia had been achieved in the maxillary posterior region. For indirect sinus augmentation, residual alveolar bone height measurements between 6 and 8 mm were made. Under local anesthetic, the residual alveolar bone that would hold the implant was made visible, and a tiny, rounded drill was used to perforate it. To determine the center of the implant placement site, a Lindemann guiding drill was positioned in the marked implant site. After the guide drill, successive drills with a larger diameter were utilized to increase the implant recipient site until the target diameter that matched the required implant diameter. The depth of the drill was kept two mm below the sinus floor. The indirect sinus lift was done by using of accurate diameter Densah ® burs and considerably increasing the diameter of burs to fracture and elevate the sinus floor without causing damage to the schneiderian membrane. In the socket, BIOACTIVE SYNTHETIC BONE GRAFT (NOVA BONE) graft material was placed (Figure 4). With the aid of bone plugger, the material was shifted apically, elevating the schneiderian membrane along with shifting synthetic graft material apically between the membrane and floor.

Surrounding region was covered with GBR Collagen Membrane (HEALIGUIDE®) (Figure 5). The prepared region was then quickly filled with the implant. Cover screws were laid down and flap was approximated with 3-0 Vicryl sutures. Patient was called back after 7 days for suture removal and placement of lower implants. In mandibular arch extractions were planned with 34, 35 and immediate placement of implants in complete lower arch was planned. Similar steps were involved while using PRF and Synthetic graft material. Implants and cover screws were placed and flap was closed. Patient was followed after 7 days for suture removal. Anti-

inflammatories antibiotics and nasal decongestants were prescribed for 5 days.
Patient was recalled after 4 months for complete osseointegration of the implants. A post-operative OPG was advised (Figure 6). Full thickness mucoperiosteal flap was raised and healing abutments were placed and flaps were sutured back (Figure 7).

Prosthetic phase:

Patient was recalled 10 days after the placement of healing abutments for open tray implant impressions. Casts were poured and jig verification was done (Figure 8). Jaw relation was recorded and casts were articulated (Figure 9). Try-in was done (Figure 10). Resin trial was checked intraorally (Figure 11). Attachment of implant abutments (Figure 12). Final prosthesis was adjusted intraorally (Figure 13).

Discussion:

Edentulous maxillary segments have a number of morphological and physiological disadvantages, including a presence of thin porous cortical bone surrounding fine trabecular bone, greater air filled cavities around maxillary sinus, and faster osteoclastic and osteoblastic activity in the absence of constant periodontal pressure. These elements make the region's restoration extremely difficult. Sinus floor elevation is considered a requirement for dental implant insertion due to the limited amount of residual alveolar bone.[5] The Indirect Sinus Augmentation procedure performed with 5-8 mm thick Residual Alveolar Bone is less invasive for predictable implant placement. For ridges with 3-5 mm thick RAB, surgical modalities as those proposed by Summers[6], Fugazzotto[7], and Toffler[8] provides easier approach in compromised alveolar bone sites. In this case report, a directed bone regeneration approach was employed because an inadequate amount of bone density was discovered during the clinical, radiographic evaluation and implant placement. Numerous data have demonstrated that GBR has an excellent outcome in regenerating bone dimensions, employing as a fundamental tenet that the type of tissue that is being regenerated will be determined by the first cells that migrate to the location.
Chiapasco et al. (2006) have introduced many biomaterials such as hydroxyapatite, bovine bone, and a mixture of them.[9] Case reports with xenogeneic materials and there uses also gave approachable results in the bone regenerated dimensions.[10] In 2015 Kökdere et al. studied PRF in adjunct with bone grafts, showcasing that it augments bone regrowth and a synergistic effect on early bone regeneration.[11] In the discussed case synthetic bone graft material was used which is in accordance with Moore et al.[12]

Conclusion:

In conclusion, indirect sinus augmentation around implants with PRF in combination with synthetic bone substitutes and PRF membranes in the guided bone regeneration technology aided in the processes of bone regeneration and soft tissue healing, favoring implant osseointegration over a six-month period and requiring patients to undertake rehabilitative treatments for both appearance and function.

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FIGURES

Figure 1

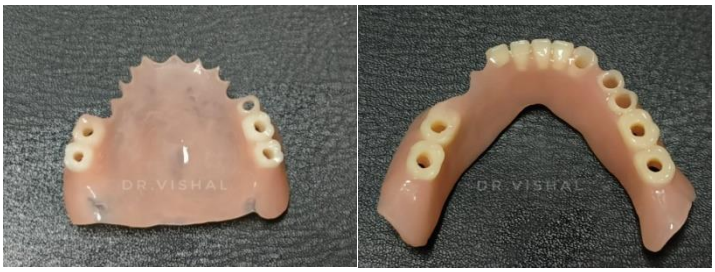

Figure 2

Figure 3

Figure 4

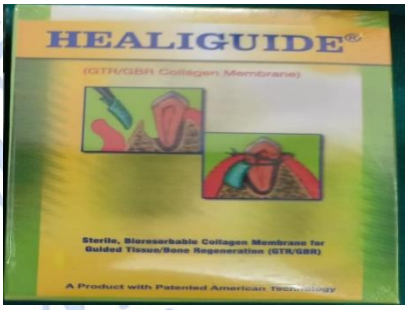

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13