

Direct sinus lift and immediate implant placement for prosthodontic rehabilitation of posterior maxillary edentulous area: A case report

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Abstract

One of the most challenging tasks in implant dentistry is placing an implant in the maxillary posterior edentulous region because of the unfavourable conditions like poor quality and scar quantity of bone. Bone remodelling in the region is further complicated by post extraction bone resorption, pneumatization of maxillary. To manage and treat these local physiological and anatomic limitations, maxillary sinus floor elevation has become an important preplacement procedure in dental implant treatment planning. This scientific case report presents a clinical case where a Direct Sinus Lift was carried out with placement of autogenous graft and immediate implant placement was done.

Keywords: Schneiderian membrane, direct sinus lift, dental implant, platelet rich fibrin.

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Introduction

The success of an implant depends on the quality and quantity of bone in which it is being implanted. These two parameters make a maxillary posterior implant placement very difficult for a prosthodontist. As the quality of bone in the posterior maxilla is mostly type IV (D4). It offers the greatest mismatch between biomechanical elastic modulus and the titanium under load.^[1] This also compromise initial healing. Secondly the quantity of residual bone in posterior maxilla is reduced by both residual ridge resorption from the crest and pneumatization of the sinus after the loss of tooth.^[2]

For managing these limitations maxillary sinus floor elevation is becoming a routine preplacement procedure in dental implant treatment planning. There are several methodologies for increasing the thickness of maxillary sinus floor. Depending on the need of bone height and density techniques range from simple, minimal elevation of maxillary sinus membrane (Schneiderian

membrane) to placement of various type of grafts including allografts, autografts, bone morphogenetic proteins, and hydroxyapatite crystals.^[3]

This scientific case report put forward the management of partially edentulous maxillary posterior arch following direct sinus lift followed placement of autogenous graft and immediate implant placement.

Case report

A 47-year-old female patient came to the department of Prosthodontics and Crown and Bridge, Kothiwal Dental College, Moradabad with a chief complaint of difficulty in chewing food from the right side of her mouth for the past two years. (Figure 1). She presented a Kennedy's class II edentulous area in the first quadrant. Patient neither had any medical condition like Type II diabetes, nor any significant family history. Denta Scan revealed that there was limited bone height of 5 mm and width of 8 mm i.r.t. 16 region (Figure 2). The treatment plan included a direct sinus lift procedure according to tatum approach

followed by immediate placement of a dental implant (NeoBiotech, IS-II Active) of length 8.5mm and diameter 4 mm. A fixed dental prosthesis was to be provided after the completion of osseointegration.

Procedure:

1. First the oral prophylaxis as done as a protocol of hygiene maintenance.
2. On the day of the surgery, 10 ml of blood was collected from peripheral vein into sterile glass tubes without any anticoagulant. It was immediately centrifuged at 3000 rpm for 10 minutes. The upper straw coloured layer is then removed and middle fraction is collected, 2 mm below lower dividing line, which is the Platelet rich Fibrin (PRF).
3. The surgical site was anesthetized (Figure 3) and the mucoperiosteal flap was raised (Figure 4).
4. After that a small window was made on the buccal aspect of the ridge using a No.6 round bur to remove the bone (Figure 5) and reach the maxillary antral lining or the Schneiderian membrane (Figure 6).
5. Once the bone was removed, the antral lining separated using curettes and was lifted up. (Figure 7, 8, 9).
6. The sequential osteotomy for was then carried with precision protecting the antral lining and the dental implant was placed. (Figure 10,11,12)
7. After the placement of implant, the remaining antrum was filled with the bone graft material along with PRF and the flap was closed using interrupted sutures.
8. Seven months later a radiography showed increase in bone height (Figure 13).
9. The second stage surgery was performed and gingival former was attached to the implant (Figure 14).
10. Impression was done using closed tray impression technique after the formation of gingival collar.
11. A porcelain fused to metal crown was fabricated for the same and was cemented to the abutment over the dental implant (Figure 15,16).

Discussion

Subantral treatment options has been classified by Misch on the basis of the amount of bone below the maxillary sinus. Sub antral augmentation category 1 (SA-1) sinus used traditional implant approaches. Category SA-2 used a sinus lift procedure within the osteotomy. For the SA-3 and SA-4 categories, a Tatum sinus graft procedure is performed before implant insertion.^[4] According to Misch, the immediate placement of implant following sinus floor augmentation through lateral window technique can be performed if the available residual bone height is ≥ 5 mm and the bone width is >6 mm. The rationale behind this is that sufficient amount of bone height and width is required for gaining initial or primary stability of dental implant. In the present case the remaining bone height was 5mm and bone width was 8 mm. Therefore, sinus floor augmentation followed by placement of implant of dimensions at the same appointment was done. Endosteal implants are inserted at the same time as the sinus lift procedure when, the remaining bone height is ≥ 5 mm and bone width is > 6 mm bone width. Neither there should not be any sinus pathology, nor any history of sinusitis. If there is para-function or, sinus membrane perforation such procedure is contraindicated.^[5] PRF is an immune and platelet concentrate collecting on a single fibrin membrane, containing all the constituents of a blood sample which are favourable to healing and immunity.^[6] PRF consists of a fibrin matrix polymerized in a tetra molecular structure, with incorporation of platelets, leucocytes, cytokines, and circulating stem cells.^[7] Various researches have confirmed that PRF is a favourable matrix for the development of a coherent healing, without any inflammatory excess. PRF is a platelet

gel which can be used in conjunction with bone grafts, which has several advantages, such as promoting wound healing, bone growth and maturation, wound sealing and haemostasis, and imparting better handling properties to graft materials. It can also be used as a membrane. Many clinical trials suggest the combination of bone grafts and PRF to enhance bone density.^[8]

The PRF is prepared from the patient's own blood.^[9] 5 ml of whole venous blood is collected into two sterile vacutainer tubes of 6 ml capacity without anticoagulant. The vacutainer tubes are then placed in a centrifugal machine at 3000 revolutions per minute (rpm) for 10 minutes, after which it settles into the following layers: red lower fraction containing red blood cells, upper straw coloured cellular plasma and the middle fraction containing the fibrin clot. The upper straw coloured layer is then removed and middle fraction is collected, 2 mm below lower dividing line, which is the PRF. The success of this technique entirely depends on the speed of blood collection and transfer to the centrifuge because, without anticoagulant, the blood sample starts to coagulate almost immediately upon contact with the tube glass, and it does take a minimum of few minutes of centrifugation to concentrate fibrinogen in the middle and upper part of the tube. Quick handling is the only way to obtain a clinically usable PRF clot.

The direct sinus lift procedure was selected over indirect because studies have shown that the gain in bone height was significantly greater in direct procedure through lateral antrotomy than in indirect method through crestal approach by osteotome technique.^[10] Bortoluzzi carried out a comparative study for 24 months on immediately inserted dental implants in sinus lift and concluded that surgery for sinus lifting, grafting and dental implants is done in posterior maxillae with very low bone heights (<4 mm) can be performed safely and simultaneously, although with lower success rates than found in patients

with higher residual bone heights (>4 mm).^[11]

Conclusion

When the quality (D3 and D4) and quantity (≤ 5 mm) of bone is questionable in posterior maxillary region, a direct sinus lift procedure should be planned prior to any implant placement. Immediate implant placement after a sinus lift procedure can be done safely but, needs proper grafts like PRF. Precision is the key to success.

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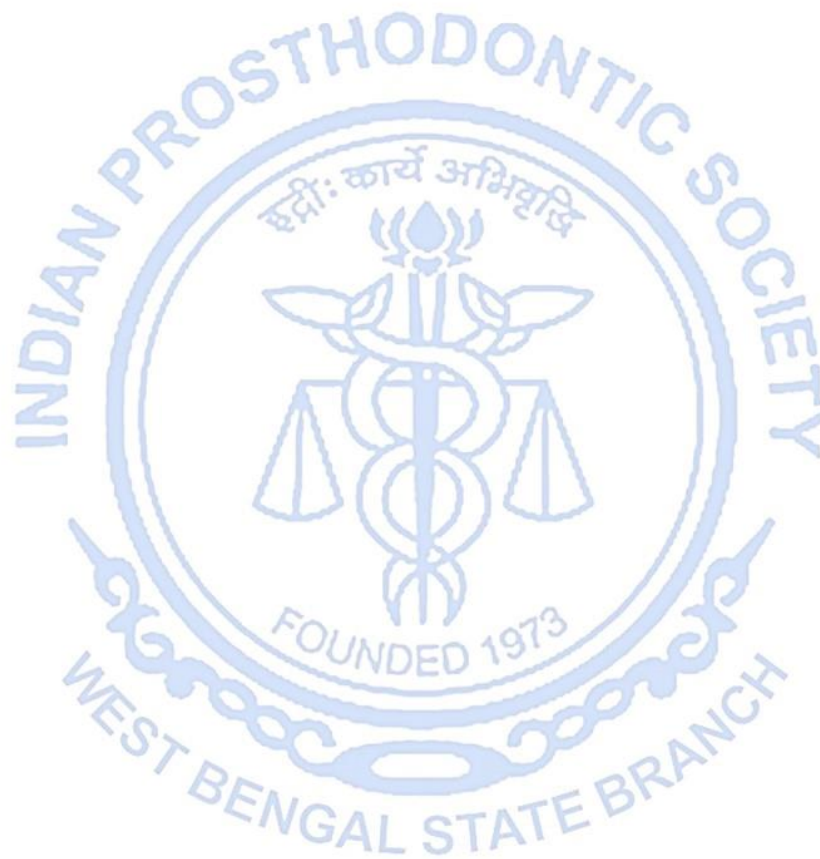
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Figures:



Figure 1

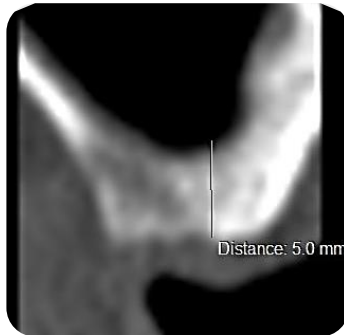


Figure 2



Figure 3



Figure 4



Figure 5

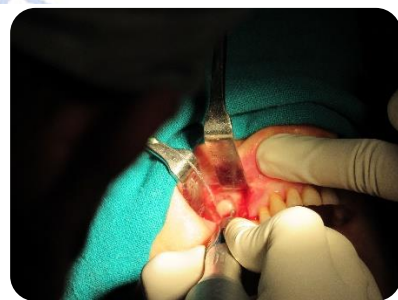


Figure 6



Figure 7

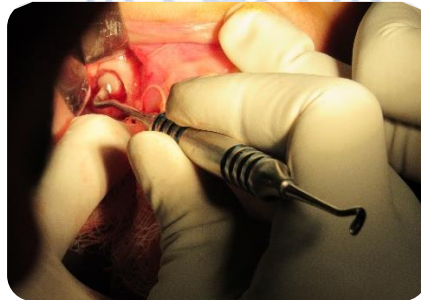


Figure 8



Figure 9



Figure 10



Figure 11

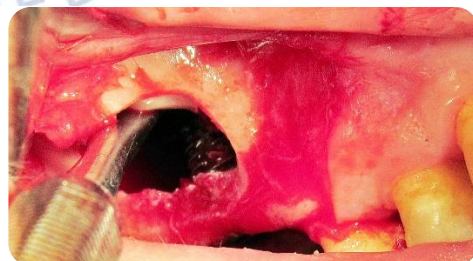


Figure 12



Figure 13



Figure 14



Figure 15



Figure 16

