

Maxillary Sinus Lift First: An Approach to Treat Posterior Maxillary Ridge in Patients with Hopeless Teeth. Technique Presentation and Our Experience

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Abstract

Purpose: The aim of this paper is to present the "open sinus lift first" technique, for the treatment of patients that need open sinus augmentation in the presence of teeth with poor and hopeless prognosis at the posterior maxilla.

Patients and Methods: During a four year period, "sinus lift first technique" was used to reconstruct six posterior maxillary ridges in five patients. All the regions need open sinus lift and have teeth with poor prognosis that should be replaced by dental implants. CBCT scan was performed 8 months after the sinus lift surgery. Teeth extraction and implants insertions were performed as a second surgery.

Results: The sinus lift first technique was performed as the first stage, the healing process was uneventful with minimal morbidity. Eight months after the operations all patients underwent CBCT scan which revealed good bone gain inside the sinus. In the second surgery the involved teeth with poor prognosis were extracted, and 11 implants with good length (13 mm) and diameters (3.75 - 4.2 mm) were placed at the posterior maxillary regions. The treated sites healed very well, and all the 11 implants were successfully osseointegrated. The final rehabilitation was completed with fixed prosthesis over the dental implants. The follow up period is 28 months in average.

Conclusions: Posterior maxillary ridges that need open sinus lift operation in the presence of hopeless teeth can be treated with the sinus lift first technique with predictable outcomes.

Keywords: Sinus Lift; Posterior Maxilla; Teeth Extractions; Primary Closure

Introduction

Maxillary sinus augmentation and placement of dental implants is a well-established procedure for esthetic and functional rehabilitation of the posterior maxilla [1,2]. This procedure can be considered a relative safe procedure with high success rate of the osseointegrated implants, if it is planned correctly [3].

The presence of teeth with poor prognosis at the posterior maxilla when sinus augmentation is required can make the treatment challenging. In those cases, several treatment options may be considered, which includes; first: extraction of the hopeless teeth, followed by sinus augmentation after several weeks. The main drawbacks of this option are the bone resorption that occurs after teeth extraction which considered to be high at the first period [4-7], also the unpredictable bone volume and quality after spontaneous healing of an extraction site.

Second option: Extraction of the hopeless teeth and socket preservation. Extraction site augmentation can save the soft and hard tissues of the site, and enhances the bone volume and quality of the treated sites [8]. In those cases, the sinus augmentation can be performed with more predictable finding of bone volume and quality during the operation, and more accurate placement of the dental implants. The main drawbacks of this approach are the waiting time and the procedure expenses.

The third option: Extraction of the teeth with the poor prognosis and sinus augmentation at the same visit, this approach may reduce the treatment duration and reduce expenses. Upon this scenario the surgeon may face more challenges and difficulties. First; The release and elevation of the schneiderian membrane that comes in contact with the roots may be more difficult and may increase the risk of membrane perforations during the sinus lift procedure, one of the most common complication [3,9,10]. Second, The primary closure obtaining and maintaining of an open wound at the extractions site is an crucial key factor for the operation success, and may be performed with wide flap with long releasing cuts and incision cuts in the periosteom and/or additional methods [11]. By those means primary closure can be obtained but with distortion of the soft tissue at the site and the loss of the vestibular depths that can disturb the function and esthetics at the future rehabilitation over the dental implants.

In this paper we present an additional treatment option, “the open sinus lift first” for patients that need open sinus augmentation in the presence of teeth with poor and hopeless prognosis at the posterior maxilla. The treatment approach, rational, advantages and drawbacks will be discussed.

Patients and Methods

During a four year period, “sinus lift first technique” was used to reconstruct six posterior maxillary ridges in five patients (4 women, one man; mean age; 49 years; range, 44 - 65 years). All the regions had teeth with poor prognosis that should be replaced by dental implants. The available bone height at the posterior maxillary regions was assessed by CBCT scan and range from 4 to 7 mm. All the patients need teeth extraction of the hopeless teeth, open sinus lift and implants placement (Table 1).

No.	Age	Gender	Side at Posterior maxilla	Involved teeth	Available bone height	Number of future Implants
1.	50	F	Bilateral	LT: 2 nd and 3 rd molars RT: 1 st premolar and 2 nd molar	LT: 5 - 7mm RT: 4 - 7mm	LT: 2 implants RT: 2 Implants
2.	44	F	Left Maxilla	1 st and 2 nd premolars and 1 st molar	4 - 6 mm	3 implants
3.	48	M	Left Maxilla	2 nd premolar 1 st and 2 nd molar	3 - 6mm	4 implants
4.	65	M	Left Maxilla	1 st and 2 nd molars	4 - 7 mm	2 implants
5.	58	F	RT Maxilla	2 nd premolar 1 st molar	5 - 8 mm	2 implants

Table1: Patients and the treated Regions.

The treatment protocol for the patients was “sinus lift first” as the first surgery. Patients were examined every two weeks in the first three months, and thereafter every 3 months. After 8 months a CBCT scan was performed, and in a second surgery the involved teeth were extracted with concomitant insertion of the dental implants. 4 months later the patients were referred to their dentist for rehabilitation. All the patient received fixed prosthesis over the implants. The average follow up period was 28 months.

Technique

Illustration case; 50 years old healthy female was referred to our clinic for bilateral sinus lifting and placement of eight implants at her maxilla. The patient underwent clinical examination and radiographic assessment that showed existing old bridges from second right molar to the second left premolar. Pontics were found at the first premolar, second premolar and first molar at the right maxilla, first

premolar at the left maxilla. The first left molar was extracted at her childhood. The abutments showed secondary caries and sever bone loss (Figure 1a). Upon the CBCT scan the available bone height was 4 - 7 mm and 5 - 7 mm at the right and left maxilla (Figure 1b and 1c). The treatment plane included, extraction of the teeth, sockets preservation, temporarily rehabilitation with complete denture at the first stage, that will be followed by second stage surgery after 4 - 5 months for bilateral sinus augmentation and placement of 8 implants. The final rehabilitation will be fixed prosthesis over the implants. The patient was averseness with the treatment plane because she had a family event, daughter's wedding, two months later. After discussion with the patient and her prosthodontist (ZKh), the treatment plane was adjusted to the patient desires and the accepted decision was performing of "sinus lift first", followed by teeth extractions and implants placement 8 months later.

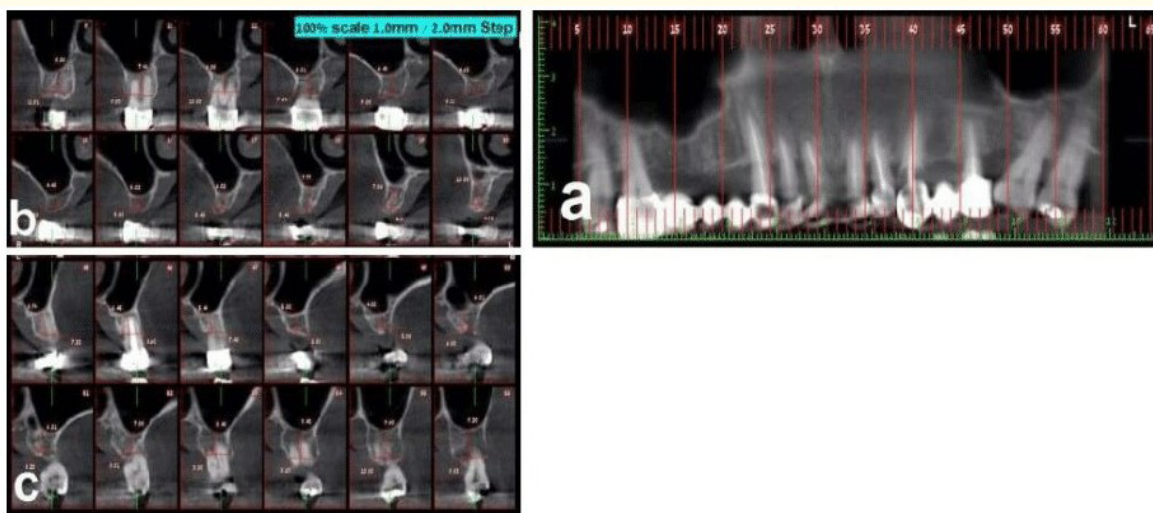


Figure 1a: Pre-op CBCT Scan, a panoramic view; Hopeless teeth at the posterior maxilla at the both sides with sinus pneumatization.

Figure 1b and 1c: Pre-op cross sections of the CBCT Scan showed the inadequate bone height at the posterior maxilla bilaterally.

At a first surgery, under local anesthesia, an envelope flaps were elevated bilaterally at the patient posterior maxilla to access the lateral sinuses wall, the sinus membrane was carefully elevated from the sinus floor over the existing teeth roots bilaterally. The sinuses were grafted with xenograft bone (Bio-Oss), and the envelope flaps were easily sutured. The healing process went very well during the follow up period.

After eight months the patient underwent maxillary CBCT scan to evaluate the new bone available for implants placement at the maxillary sinuses region (Figure 1d). The bone height was 13 to 18 mm at those areas, with bone gain of 8 to 11mm (Figure 1e and f). Then the second operation was performed. During this surgery, the maxillary teeth were extracted, 8 implants were placed, four at the pre-maxilla, two at the right molars area, and additional two implants at the left molars area (Figure 1g). The inserted implants dimensions were 4.0/13 mm. Socket preservations was performed at the extracted central incisors to enhance the final esthetics of the anterior maxilla. At this staged the mandible was treated (Figure 1g and h). Four months later the patient underwent full mouth rehabilitation with fix prosthesis over the implants with excellent functional and esthetics outcomes (Figure 1i-1k).

Figure 1; Case 1



Figure 1d: Post-op CBCT Scan, a panoramic view demonstrates the “sinus lift first” technique with the bone graft inside the maxillary sinuses bilaterally.

Figure 1e and 1f: Post-op cross sections of the CBCT Scan showed the bone gain with the good height at the posterior maxilla bilaterally.

Figure 1g: The patient panorex after the second surgery that included teeth extraction and implants placement.

Figure 1h: The primary panorex, The mandibular teeth were also with poor prognosis.

Figure 1i to k: The final rehabilitation with fixed prosthesis over the implants.

Figure 2 demonstrates an additional case(patient 5) that was treated by ‘sinus lift first technique’, in this patient , open sinus lift grafting and insertion of two implants was planned to replace the right second and first molar that should be extracted due to hopeless prognosis (Figure 2a and 2b). In this case, also, the sinus lift was performed as the first stage (Figure 2c), and the CBCT scan after 9 months demonstrated the bone gain at the sinus area, which was 6 – 11 mm (Figure 2d and 2e). At the second surgery the involved teeth were extracted in concomitant with placement of two implants (Figure 2f).

Figure 2; Patient 5

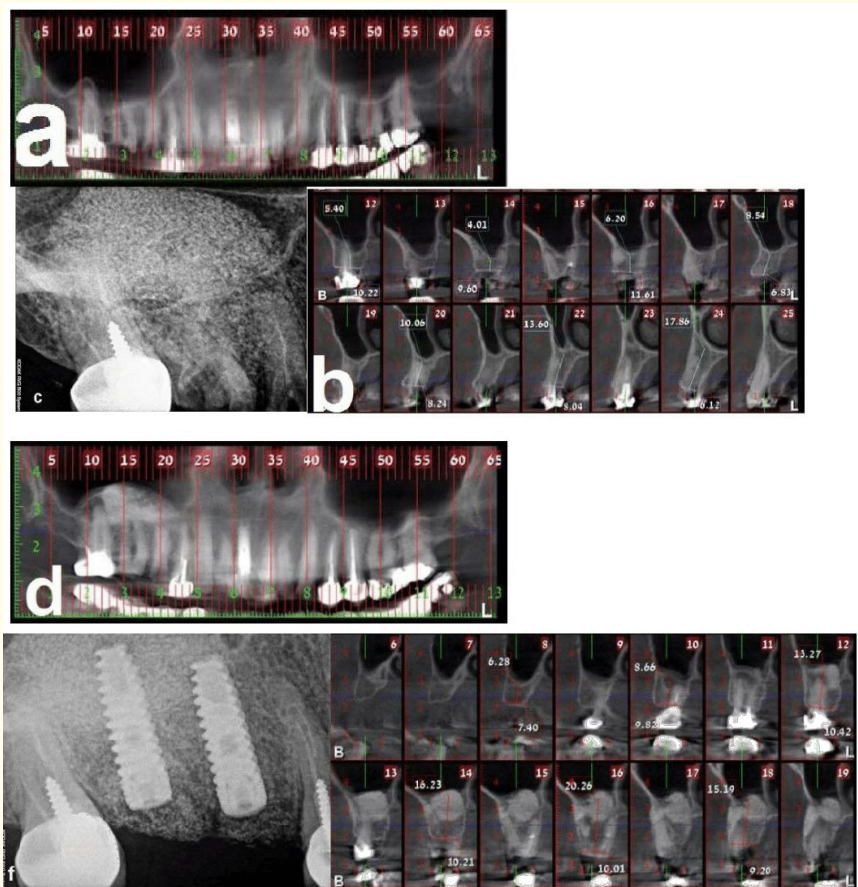


Figure 2a: Pre-op CBCT Scan, Right posterior maxilla, the roots of the second premolar and the first molar are for extractions, the short residual ridge in this region.

Figure 2b: Pre-op cross sections of the CBCT demonstrate the inadequate bone height at the posterior maxilla.

Figure 2c: Periapical radiograph after the sinus lift first surgery.

Figure 2d: Post-op CBCT Scan, a panoramic view demonstrates the "sinus lift first" technique with the bone graft inside the right maxillary sinus.

Figure 2e: Post-op cross sections of the CBCT Scan showed the bone gain with the good height at the right posterior maxilla.

Figure 2f: Periapical radiograph after the second surgery; teeth extraction and placement of two implants.

Results

Five patients were treated with the sinus lift first technique, the healing process was uneventful with minimal morbidity. Six sinus augmentations were performed and maintained during the healing period without complications. Eight months after the operations all patients underwent CBCT scan which revealed good bone gain (6 - 11 mm in average) inside the sinus. The new available bone was

(14 - 18 mm in average) mm. At the second surgery the involved teeth with poor prognosis were extracted, and 11 implants with good length (13 mm) and diameter (3.75 - 4.2 mm) were placed at the posterior maxillary regions. The treated sites healed very well, and all the 11 implants were successfully osseointegrated (Table 2). The final rehabilitation was completed with fixed prosthesis over the dental implants. One of the patients stated that he feels excellent with the teeth in the treated area and refused to move to the planned second surgery which was to extract the teeth and implants insertion (Figure 3a and 3b). This patient is followed for two years.

Patient Number	Bone Gain	New Available Bone	No. of Implants	Follow up
1	LT: 5 - 11 mm RT: 6 - 10 mm	LT: 13 - 16 mm RT: 14 - 18 mm	LT:2 (3.75/13 mm) RT:2 (3.75/13 mm)	32 months
2	9 - 11 mm	14 - 20 mm	2 (3.75/13 mm)	24 months
3	6 - 11 mm	15 - 18 mm	2 (4.2/13 mm)	29 months
4	9 - 12 mm	16 - 20 mm	Refused implants	28 months
5	6 - 11 mm	16 - 22 mm	2 (4.2/13 mm)	19 months

Table 2: Patients, bone gain, implants, and follow-up period.

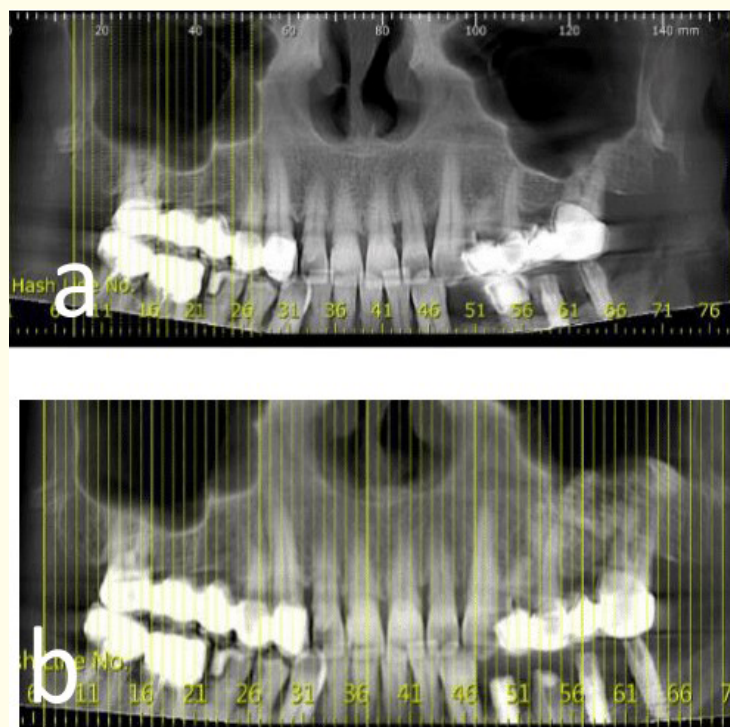


Figure 3a: Pre-op CBCT Scan showed the left posterior maxilla. The second premolar and the second molar are for extractions and the short residual ridge in this region.

Figure 3b: Post-op CBCT Scan, a panoramic view demonstrates the “sinus lift first” technique with the bone graft inside the right maxillary sinus.

The final outcomes were satisfied with good esthetics and function. All the patients were happy with the treatment sequence and the final outcomes. The follow up period is 28 months in average.

Discussion

The authors have used the “sinus lift first technique” in six posterior maxillary regions during the past four years. The technique indications were maxillary sinus pneumatization with residual bone that necessitates lateral sinus augmentation, the presence of hopeless teeth that should be extracted and placed with dental implants which will be rehabilitated with fixed prosthesis. Performing of the sinus lift as the only procedure during the first surgery, without teeth extractions and implant placement appears to reduce the intraoperative complications because it can improve the visibility during the surgery that may be disturbed if the involved teeth were extracted simultaneously. Despite the fact that the elevation of the sinus membrane could be difficult if it is close to the roots, it was completed without perforations in our patients due to the excellent visibility and short operation time. The access to the lateral sinus wall by this technique was achieved with envelope flap around the teeth which allow reaching the lateral window easily and fast with excellent visibility. Last but not least, the sinus lift first technique, without concomitant extractions make the primary closure over the sinus grafted materials very easy with minimal chance of wound dehiscence. The primary closure that was easily obtained intraoperatively and maintained during the healing period is crucial success factor in the different bone augmentation procedures.

In similar cases, like our cases in the present paper, there are several approaches for treatment which includes; first; staged surgery; hopeless teeth extractions followed by delayed sinus lift and implants insertion(early 8 weeks, and late 6 months) [12]. Extractions of the hopeless teeth with sockets augmentation that are followed by delayed sinus lift and implants placement (usually after 4 - 5 months), is a second approach. In the both approaches, Performing of the sinus lift after enough healing period of the extraction sites have a common advantage of good soft tissue primary closure over the augmented sinus. Treatment of those cases with one surgery is the third treatment option, and means simultaneous teeth extractions, open sinus lift augmentation and implants placement. This approach may reduce the overall treatment period, but is less predictable due to intraoperative challenges which includes; Elevation of wide flap, less visibility due to concomitant extractions and bleeding, sinus membrane perforations, constrictions in placing of dental implants only at areas with enough bone inside a wide socket and not at the optimal location. The major difficulty with this approach is the primary closure of the open socket wound especially at the molar regions. Wide flap with extensive releasing incisions, releasing cuts at the elevated flap periosteum, are usually performed for primary closure, and in some cases soft tissue grafts may be obligatory to achieve the primary closure [11]. The invasiveness of the last approach may be with big morbidities and undesired complications.

The short operative time, reduced invasiveness, improved visibility, lower risk of membrane tearing, the easy and safe primary closure and the less postsurgical morbidities are the possible advantages of the “sinus lift first” technique over the above mentioned approaches.

Additional advantage of this technique is that the hopeless involved teeth can be used as/or for temporary rehabilitation for the healing period after the sinus lift, usually for several months.

Conclusions

Posterior maxillary ridges that need open sinus lift operation in the presence of hopeless teeth can be treated with the sinus lift first technique with predictable outcomes. The treatment sequence of the “sinus lift first techniques” reduced the intra-operative complications and the post-operative patient’s morbidities.

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Nil.

Conflicts of Interest

There are no conflicts of interest.

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