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CASE REPORT

# Le Fort I Osteotomy with Iliac Bone Grafts and Delayed Oral Implants for the Rehabilitation of Extremely Atrophied Maxilla

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## Abstract
In this case report, the rehabilitation of a severely resorbed edentulous maxilla with Le Fort I osteotomy combined with inter-positional autogenous bone grafts was presented. A 46-year-old woman applied to our clinic for the rehabilitation of edentulous maxilla and mandible. Her systemic history revealed diabetes type 1. It was seen that the maxilla was severe atrophic and inter-occlusal distance was increased due to excessive bone loss both vertically and horizontally. The patient was planned to undergo iliac bone graft with Le Fort 1 osteotomy. The maxilla was positioned 6 mm forward and 3 mm down. First, interposition grafting was performed in combination with Le Fort I surgery. Implants were placed after 4 months. Le Fort I osteotomy combined with inter-positional autogenous bone grafts gives successful results in the edentulous patient who has excessive resorption pattern with Class-III occlusal relationships and increased inter-occlusal distance.

**Keywords:** Le Fort I osteotomy; Iliac bone graft; Dental implants; Edentulous maxilla

## Introduction
Rehabilitation of the atrophic maxilla with dental implants is troublesome for the oral and maxillofacial surgeons. Multidimensional resorption of the maxilla is seen in type V and type VI according to the classification of Cawood and Howell[1]. In particular, severe atrophy of these types of edentulous maxilla can lead not only to insufficient bone volume, but also to a negative vertical, transverse and sagittal inter-arch relationship due to the longitudinal three-dimensional resorption pattern of the maxilla[2]. In addition, maxillary sinus pneumatisation can further reduce the available bone for a reliable implant-supported dental rehabilitation. In such cases, dental implant placement may be possible with some well-known techniques such as onlay bone grafts, maxillary sinus grafting and guided bone regeneration. However, it is difficult to restore an accurate intermaxillary relationship. In these cases, the maxilla is repositioned both vertically and downwards by Le Fort I osteotomy with interposition autogenous bone grafts. Thus, both the intermaxillary relationship is corrected and sufficient bone height is provided for implant placement[3,4,5].

In this case report, we want to present the case which rehabilitated with Le Fort I osteotomy combined with inter-positional autogenous bone grafts known as the maxillary down-grafting procedure.

## Case Presentation
A 46-year-old woman applied to our clinic for rehabilitation of edentulous maxilla and mandible. Her systemic history revealed diabetes type 1 and a HbA1c of 8.1. It was also learned that she had undergone dental implant surgery in another centre but she had lost the implants after 1 year due to mobility. After a detailed intra-oral and radiographic examination, it was seen that the maxilla was severe atrophic (Fig 1). Inter-occlusal distance was increased due to excessive bone loss both vertically and horizontally, and a Class-III relationship was observed. Since the patient's HbA1c was high, it was recommended that the patient first apply diet and use her medication regularly to reduce this value. HbA1c decreased to 5.9 at the end of 3 months and the patient was planned to undergo iliac bone graft with Le Fort 1 osteotomy.

The surgery was performed under general anaesthesia with nasal endotracheal intuba- tion. At the start of the operation the patient was given 1 g sefazolin. Local anaesthesia with vasoconstrictor was used to minimise bleeding in the soft tissue. A vestibular incision was made from the premolar area on one side to the other. The mucoperiosteal flap was elevated. While the sinus walls and nasal floor were exposed, the alveolar crest was not opened due to the thickness of the alveolar ridge is sufficient. The surgical procedure for the Le Fort I consisted of maxillary bilateral osteotomy from the piriform rim to the pterygoid plate, lateral nasal and septal

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osteotomy with pterygo-maxillary separation. The down-fracture was performed according to the method described by Precious et al[6]. The nasal mucosa was sutured because of the small lacerations. After that the sinus membrane was removed from the sinus floor. Since the procedure was performed with a single team, donor site surgery was started following Le fort I osteotomy. The iliac crest was exposed and cortico-cancellous bone block was harvested from the anteromedial side of the ilium in one peace. The block was cut into pieces according to the shape of the recipient region with a bone saw and the blocks were fixed with screws to the nasal and sinus floor regions of the maxilla (Fig 2). The grafted maxilla was positioned 6 mm forward and 3 mm downwards and it was stabilized by two titanium mini-plates on each side of the nasal aperture and zygomatico buttress. In addition, the gap region was supported by particulate autogenous grafts. (Fig 3-4). A few pieces of block autogenous grafts were also used to increase the vertical height of the mandibular crest. The region was primarily closed with 3-0 silk suture. The patient was hospitalised for 2 days. There was no complication on the postoperative period. The patients were instructed not to wear their removable denture during the postoperative period. After a healing time of 4 months dental implants were placed in the grafted maxilla (Fig 5-6).

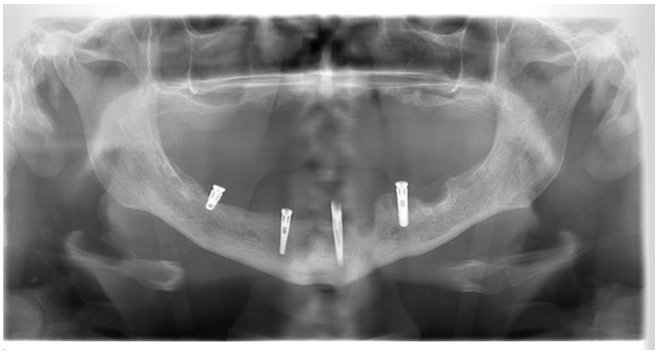

Figure1: Preoperative radiographic image

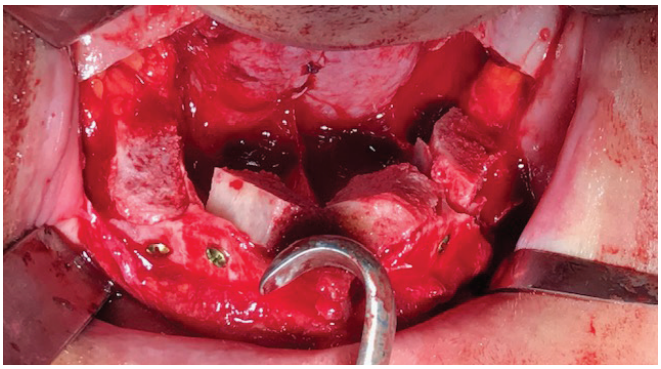

Figure 2: The received block grafts fixed to the nasal base and to the sinus region with screws.

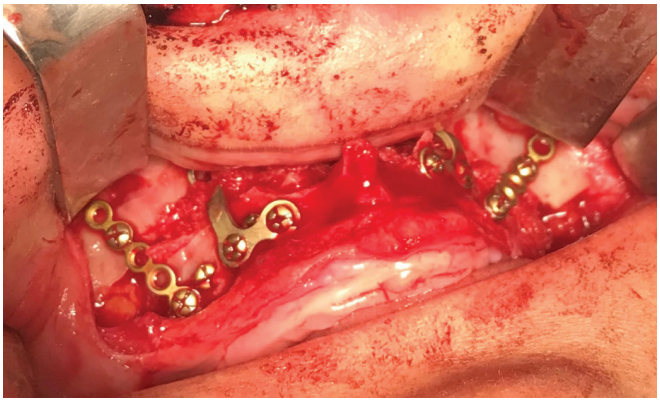

Figure 3: The maxilla was fixed to the cranial base with mini-plates and screws traditionally.

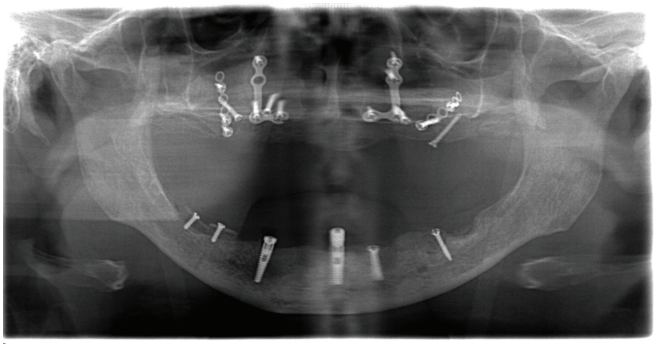

Figure 4: Early postoperative radiographic image after operation.

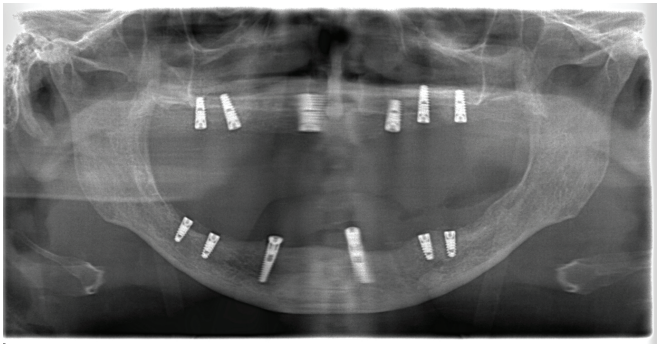

Figure 5 The dental implants were placed in the newly created bone regions.

## Discussion

The main purpose of the rehabilitation of edentulous maxilla or mandible is providing bone mass to place dental implants. This can be obtained by performing some techniques including vertical or horizontal bone augmentations, sinus floor elevation and orthognathic surgery[7,8,9]. The excessive resorption of edentulous maxilla and mandible often cause Class-III malocclusion[10]. In such cases, the patient has a little chance of having a successful implant-supported prosthesis with only augmentation procedures. Therefore, there is no alternative to orthognathic surgery for the partial or complete resolution of the resulting Class-III relationship. In our case, we performed Le fort I osteotomy because there was a serious resorption and a class 3 occlusion relationship. Because of the high amount of compact bone in edentulous mandibula,

we did not perform sagittal split osteotomy in the mandible due to the possibility of bad split.

Patients who have knife-edge alveolar crests (adequate height and inadequate width bone volume) were described by Cawood and Howell as Class-IV bone resorption[1]. The cases with this resorption are contraindicated for this procedure because the thin alveolar crest remains after the Le Fort I osteotomy and the problem persists when the time for implant surgery comes.

In patients with inadequate bone height due to severe alveolar resorption (Cawood Class-V), such as a flat crest form, or in patients with significant basal bone loss (Cawood Class-VI), the intermaxillary vertical distance is increased and a Class-III relationship is evident. In such cases, Le Fort I osteotomy with inter-positional bone grafts is preferred as in our case.
For many years, Le Fort-I osteotomy has been performed in such cases. Some authors have argued that single-stage surgery (simultaneous placement of implants) has low morbidity and provides reliable long-term results[3,11]. However, others have reported that two-stage surgery gives more reliable results, that the risk of bone necrosis is reduced and that implants can be placed in more accurate positions[4,5]. In this case, we preferred two-stage surgery. Because we aimed to ensure osteointegration of the grafts in the region and to place the implants according to the final position of the jaws.

## Conclusion

Le Fort I osteotomy combined with inter-positional autogenous bone grafts gives successful results in the edentulous patient who has excessive resorption pattern with Class-III occlusal relationships and increased inter-occlusal distance.

## Source of Finance

No

## Conflict of Interest

No conflict of interest

## Authorship of Contributions

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