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## RESEARCH ARTICLE

# FULL MOUTH REHABILITATION WITH ALL ON 6 PROTOCOL USING BONE GRAFT AND NERVE REPOSITIONING: A CASE REPORT

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**ABSTRACT**

Implant-supported fixed restoration is a well-established treatment method for edentulous patients. Long-term clinical studies have shown that this type of restoration can be successful for many years.[1-3]Full-arch rehabilitation, a term used by many practitioners, has become a popular restorative option in dental settings. There have been many reports in literature on the use of full-arch[4-5], fixed implant-retained prostheses. While planning for implant in maxilla and mandible, the quality of bone, ridge proximity to the maxillary sinus and the inferior alveolar/mental nerve position has to be assessed and implant has to be placed keeping in mind these anatomic factors. We hereby describe a case of edentulous maxillary and mandibular atrophic ridge that was treated with bilateral direct sinus lift surgery, bone graft placement, bilateral inferior alveolar nerve repositioning and all on 6 implant placement



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## INTRODUCTION

Edentulous patients are a diverse group comprised of those who are anatomically deficient, medically compromised and mostly geriatric (Bhandare, 2015). Edentulous patients commonly have a resorbed alveolar ridge making it difficult to fabricate a conventional complete denture. Implant supported overdenture gives denture with excellent retention and stability (Bhandare, 2015). In cases of atrophic ridge, especially in posterior maxilla, a sinus lift for implant placement is considered one of the most predictable procedures for augmenting bone in the maxilla.[7]Several approaches have been developed and are currently used. The lateral approach using a Caldwell-Luc osteotomy is historically the first main technique, where the Maxillary sinus floor is grafted to provide a sufficient quantity of bone for the placement of endosteal dental implants. Using this approach, implant placement can be performed in one surgical stage depending on the residual alveolar bone height. In patients with limited alveolar crest height in edentulous posterior sectors of the mandible, different osseointegrated implant-based rehabilitation techniques can be used: placement of a bone graft in the alveolar crest, alveolar distraction, and inferior alveolar nerve repositioning (Del-Castillo-Pardo-de-Vera, 2008). Inferior alveolar nerve repositioning can be carried out under local anesthesia.

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The technique makes it possible to place the dental implants in the same surgical step. However, nerve repositioning is a complex procedure, with a high risk of sensory disturbances (Nocini, 1999; Metzger, 2006). The first case of repositioning in the context of osseointegrated implant placement was described by Jensen and Nock (Jensen, 1987) in 1987, with normalization of sensory function 5 weeks after surgery. Lateralization of the inferior alveolar nerve offers the following advantages:

- Implants of greater length can be placed in the same surgical step.
- Greater primary implant stability is afforded thanks to the possibility of bicortical mandibular fixation.11-13
- Only a physical examination and simple radiological study (e.g., panoramic X-rays) are needed.
- Increased protection of the dental neurovascular bundle is afforded during implant placement.14-16
- No bone grafting is needed, and donor site morbidity is avoided.

## CASE REPORT

A 62 year old male patient came to us with a chief complaint of missing upper and lower teeth and desired to get them replaced with a fixed prosthesis. He presents with history of upper and lower teeth mobility 7 years ago following which he got his upper and lower anterior teeth removed and replaced with a removable partial denture.

**Fig 1- Pre OP OPG**

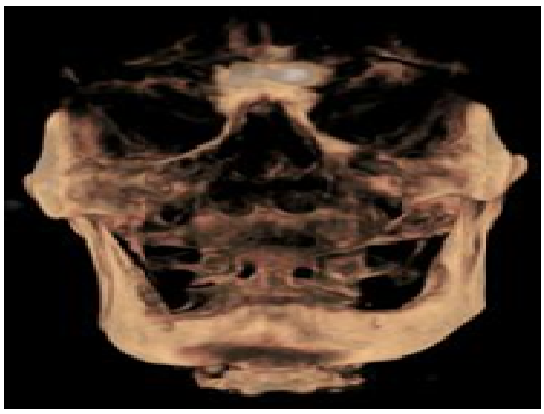

**Fig 2- Pre OP CBCT**

**Fig 3- Pre Op Ridge**

**Fig 4- Knife edge maxillary ridge**

**Fig 5- Knife edge Mandibular ridge**

**Fig 6- Bony window in right maxillary sinus wall**

**Fig 7- Sinus Lift**

**Fig 8- Bone Graft**

**Fig. 9. Implant placement completed on right side**

**Fig. 10. Nerve repositioned on Right side**

**Fig. 11. Implant placement after nerve repositioning**

**Fig 12. Post Op OPG**

**Fig 13. Immediate temporary screw retained denture**

**Fig 14. Final Denture (post 6 months)**

Four months ago he got all his remaining teeth extracted and got them replaced with upper and lower removable complete denture. On intra oral examination, there was no soft tissue abnormality detected. He had a completely edentulous upper and lower arch. The maxillary and mandibular alveolar ridge was knife edged. A Cone beam computed tomography was taken to examine the bone height, quality of bone, the maxillary sinus and the proximity of the inferior alveolar nerve and mental foramen to the alveolar ridge. A treatment plan was decided based on the clinical findings and radiographic examination. Patient was advised alveoloplasty of maxillary and mandibular ridge to achieve a flat ridge, bilateral direct sinus lift procedure with allogenous bone graft and membrane for maxillary alveolus and a bilateral inferior alveolar nerve repositioning for the mandibular alveolus followed by all on 6 implants for maxillary and mandibular arch.

## PROCEDURE

Under sterile aseptic conditions, bilateral posterior superior alveolar nerve block, bilateral infra orbital nerve block, bilateral greater palatine nerve block, nasopalatine nerve block, bilateral inferior alveolar nerve block, bilateral lingual nerve block and bilateral mental nerve block was administered. Betadine painting and sterile draping was done. Crestalincison was given on the maxillary alveolar ridge and full thickness mucoperiosteal flap was raised. Under copious saline irrigation alveoloplasty was performed and the knife edge ridge was

flattened. A rectangular bony window with corners and sharp edges was obtained using a round diamond bur at low speed with copious saline irrigation. When the osteotomy was almost complete, the sinus membrane, which is bluish- purple, was observed. After completion of osteotomy, the bony wall was mobile and attached only to the underlying sinus membrane. The bony wall was tapped into the sinus hinging on its superior margin while still attached to the membrane. The sinus membrane was gently reflected and elevated using special curettes to create space for the graft material. Bio Oss pen bone graft with large particle size was packed into the space created. A Creosxenoprotect collagen membrane was used to cover the window and the lateral wall of the graft. Implants were then placed in 17, 15 and 12 teeth region and a multiunit healing abutment was fixed. Finally, the mucoperiosteal flap was repositioned and sutured. Similarly a sinus lift with bone graft and collagen membrane was performed on the left side and implant was placed in 27, 25 and 22 teeth region and wound was sutured. A crestal incision was given on the mandibular ridge and a full thickness mucoperiosteal flap was raised. Under copious saline irrigation, alveoloplasty was performed and the knife edge ridge was flattened. The mental nerve and foramen was identified on the right side and anosteotomy was performed posterior to the foramen using adiamond drill, until the nerve was fully exposed over its anterior curvature. We continued drilling of the external cortical layer about 1.5 cm along the trajectory of the nerve until it was fully lateralized. A similar procedure was performed on the left side and lateralization of the nerve was performed. Then, under direct visualization, implants were placed at the crestal level in 36, 34, 32, 42, 44 and 46 teeth region. Multiunit healing abutment was placed. The mucoperiosteal flap was repositioned and sutured. Broad spectrum antibiotic treatment was administered. A soft diet with good oral hygiene was indicated. On the next day, the patient reported slight paresthesia of the lower lip. Controlpanoramic X-rays were obtained. An alginate impression was taken on the next day and a screw retained temporary denture was fabricated and delivered to the patient.

## DISCUSSION

Comparative studies by Rashid *et al*.[30]and Assunção *et al*.[31], in patients wearing conventional dentures and Implant Supported Overdentures, they concluded that: implant supported overdentures produced less bone reabsorption, had greater retention and stability and that they possess a better chewing function, thus increasing patients' satisfaction and improving their quality of life. These will be indicated in severe bone resorption, as it might compensate the loss of lip support avoiding air or saliva lost when speaking as it often occurs with fixed implant rehabilitations. Due to biomechanical requirements and worse bone quality, treatment options are just two: four or six-implant-supported overdentures, with an antero-posterior extension as wider as possibleSlot *et al*.[32], in a meta-analysis to evaluate the most successful maxillary treatment, concluded that six implants and a bar followed by four implants and a bar and last, four implants and ball attachments, constitute the most successful treatment. We decided to place 6 implants in maxillary and mandibular arches for maximum stability of denture as the quality of bone was poor. Sinus floor elevation with bone augmentation of the maxillary sinus is now a well accepted procedure used to increase bone volume in the posterior maxilla. In the present case, on radiographic examination, the available bone height in the sinus region bilaterally was very minimal (around 2mm) from the maxillary sinus lining. This could be due to periodontal condition of the teeth before the extraction and use of removable denture. This could have caused continuous loss of bone height and density and an increase in antral pneumatization (Garg, 1994; Thomas, 1990).

**Direct sinus lift with simultaneous implant placement procedure has certain advantages:**

- Window allows exposure & elevation of the sinus membrane from all sinus bony walls (the lateral wall of the nasal cavity, the maxillary tuberosity, inferiorly to the floor & to the posterior wall of the maxillary sinus) to form a large host site which is crucial for bone graft consolidation during phase I bone formation (Peleg, 2006).
- Rare chances of mis-alignment of the implant because of provision of direct vision of the
- surgical site (Peleg, 2006; Woo, 2004).
- Ability to diagnose membrane perforation & to treat it under direct vision (Cristina Sanchez-Recio, 2011).
- Direct addition of the graft material through the drilling site ensures even distribution of
- it in all the directions resulting in the dome shaped elevation around the implant apex (Cristina Sanchez-Recio, 2011).
- The greater the surface area of the recipient site, the greater number of stem cells &
- endosteal osteoblasts that will potentially available (Peleg, 2006).
- Average gain in bone height is significantly more due to possibility of higher elevation
- of sinus membrane via direct sinus lift procedure (Woo, 2004).
- The technique exhibited more osteoid matrix formation (Esfahanizadeh, 2012).
- High predictable results can be obtained (Peleg, 2006; Cho-Lee *et al*. 2010; Esfahanizadeh *et al*., 2012).
- Safe surgical procedure with low prevalence of complications (Jose Vina-Almunia *et al*. 2009)

Three dimensional computed tomography[27], denta-scan or C.B.C.T. image analyses provides useful information that can avoid unnecessary complications (perforation of maxillary sinus membrane) during sinus augmentation procedures by facilitating adequate & timely identification of the anatomic structures inherent to the maxillary sinus (Park, 2011). The maxillary sinus makes a good graft recipient for augmentation material because of the good surrounding bone. The rate of survival of the implants in the augmented posterior sinus appears to be better than that in posterior maxilla with poor quality of bone. In this case, a direct sinus lift surgery was performed and bone graft placement was done followed by simultaneous implant placement. The patient did not have any post operative complication. We have reviewed a number of studies published in the literature on repositioning of the inferior alveolar nerve for implant placement in mandibular posterior sectors. The best results reported to date are those of Morrison *et al*.[16] who presented a series of 20 alveolar nerve lateralizations in 12 patients. In four cases sensory disturbances persisted for more than 6 months, though these

did not interfere with daily life in any way. Osseointegration of the 30 positioned implants was 100%. Rosenquist *et al*. (1992) in turn published the largest series (114 patients subjected to the lateralization technique), with the longest duration of follow-up. Implant osseointegration was 95% after 6 months, and 93% after 18 months. Eighty percent of the patients experienced neurosensory changes. After 18 months, 94% had normalized, while 4% continued to present hypoesthesia that was well tolerated. Only one patient suffered permanent complete anesthesia. Hori *et al*. (2001) performed inferior alveolar nerve repositioning in 6 patients with the placement of 26 implants in mandibular posterior sectors. Three years after surgery, implant osseointegration was 100%, and 5 patients experienced mild hypoesthesia that was not regarded as a problem. In our case, there was no post operative complication other than mild parasthesia of lower lip for 4 months.

**Conclusion**

Implant supported overdenture is more stable, retentive and improves the mastication and speech dramatically. Edentulous patients often do not get accustomed to wear conventional dentures. Their support is compromised by progressive bone resorption that will increase patient's instability, insecurity and discomfort. Lateral sinus lift procedure is the best available solution for insufficient quantity of the alveolar bone during the implantation into the posterior part of the maxilla. It allows for a conservative, aesthetic alternative and also provides a stable foundation for treating complete edentulism. Its role in current dental implantology is still non-replaceable. Inferior alveolar nerve repositioning allows implant placement in atrophic mandibles without the need for bone grafting, in the same surgical step. However, nerve repositioning is a complex procedure, with a high risk of sensory changes (anesthesia, paresthesia or neuralgia, mostly of a transient nature, but sometimes permanent). Careful nerve manipulation and mobilization is required in order to reduce the risk of neurosensory alterations. Implant-based rehabilitation of edentulous mandibular posterior sectors with inferior alveolar nerve repositioning is thus a valid management option in selected cases, and despite the possible complications (e.g., paresthesias), the technique is usually well tolerated by the patients. Thus, surgeon skill is very important to reduce the risks of damage to the nerve.

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