International Journal Dental and Medical Sciences Research
Volume 3, Issue 1, Jan-Feb 2021 pp 373-376 www.ijdmsrjournal.com ISSN: 2582-6018

# Direct sinus lift and immediate implant placement: A clinical study. Oral and Maxillofacial Surgery.

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Submitted: 1-01-2021 Revised: 13-01-2021 Accepted: 15-01-2021

**ABSTRACT:** Aim- The aim of the study was to evaluate the success of direct sinus lift procedure in severely atrophic posterior maxilla.
Material and methods- Direct sinus lift procedure was carried out at 12 sites in 10 patients. All patients included in the study presented with partially edentulous posterior maxilla with one or more missing teeth and residual bone height less than 5mm. Three months after surgery, patients were evaluated to access increase in residual bone height, density of new bone formed and implant stability.
Result- At 3 months increase in residual bone height was 8.31+_1.63mm and mean density of new formed bone around implant was 417+_66HU. All implants were stable.
**Key words:** Edentulism, implant, posterior maxilla, sinus lift.

## I. INTRODUCTION-

Following extraction, poor quality of remaining alveolar bone, pneumatisation and high occlusal forces makes implant placement in posterior maxilla a difficult task. The process of repair in area of dental extraction leads to bone resorption due to absence of stimuli generated by occlusal forces. When this situation remains, the osteoclastic activity becomes continuous, causing decrease in thickness of the alveolar border and vestibular face of the jaw bones and later decrease in bone height. Bone loss observed in the first three years after tooth extraction is 40-60%, which may hamper or even render impossible the prosthetic rehabilitation of the area in question through the use of osseointegrable implants without previous surgical procedures for bone reconstruction. For installation of the implants, the remaining alveolar ridge should have adequate height and thickness, so that the implant ideally possess 1.5 mm of bone tissue along its entire circumference. In contrast, the existence of a thin layer of bone may lead to exposure of the metal due to bone resorption and soft tissue dehiscence. The absence of sufficient bone volume in posterior maxillary region can generate several complications for oral rehabilitation through osseointegrable implants. In addition, severe resorption of the posterior maxillary region may also leads to changes in chewing, swallowing, speech and consequently leading to psychological disturbances. In 1987, Misch developed a classification for treatment of edentulous posterior maxilla based on the amount of bone available below the antrum and ridge width.

SA1- It has adequate vertical bone for implants which is 12 mm
SA2- It has adequate vertical bone for implants which is 10 mm
SA3- It has just 5-10 mm of bone below sinus.
SA4- It has less than 5 mm of bone below sinus.

It has been seen that the maxillary sinus lift procedure as an excellent treatment option for posterior maxillary edentulism and when performed well, sinus graft procedures produces a significant amount of bone , allowing the installation of implants in an anatomic and proper position. Technique known as sinus lift was developed by Tatum in 1975. Tatum described a vertical increase of the antral floor with a crestal access. In 1980, Boyne and James published a surgical technique with access through the lateral wall of the sinus, elevating the floor and grafting bone from the iliac crest, allowing the placement of dental implants in the process. In 1986, Tatum published two vertical augmentation technique for the antral floor. Maxillary sinus floor augmentation increase the amount of bone in the posterior maxilla by elevating sinus membrane from underlying bone and placement of bone graft beneath it. Implant can be placed at the same time as sinus floor augmentation surgery (simultaneous placement) or after a healing period (delayed placement). The two main technique of sinus floor elevation are as follow- a) Lateral window ( direct sinus augmentation technique) b) Transcrestal (indirect sinus augmentation technique).

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When residual vertical alveolar bone height of more than 5mm is present, osteotome – mediated sinus floor elevation (indirect technique) and simultaneous placement of implants with or without the use of graft material are usually indicated. When the residual bone height is 5mm or less, lateral window technique with a grafting material is indicated. The direct sinus technique described by Tatum is to access the sinus cavity by creating a window in its side wall with a round bur, which after carefully taking off the sinus membrane is displaced inward in the form of hinge. The newly created floor allow the space to be maintained for the introduction of graft material and offers anchorage for the implants.

## II. MATERIALS AND METHODS-

The study included 10 medically fit patients from December 2017- June 2019 of an age group of 20-40 years irrespective of gender visiting the dept. of Oral and Maxillofacial Surgery in M.R.Ambedkar Dental college and hospital, Bangalore.

Patients presenting with edentulous, atrophic posterior maxillary ridges either unilaterally or bilaterally were included in the study. Ethical approval was obtained from Institutional Review Board. Inform consent was taken from all patients. Patients were included in the study based on inclusion and exclusion criteria mentioned below:

Inclusion criteria-
1. Partially or completely edentulous posterior maxilla with residual bone height less than 5 mm.
2. Six months gap between tooth extraction and implant placement.
3. Presence of healthy or restored adjacent teeth.
4. Patient with controlled systemic condition (ASA physical status: category 1 and 2 ).
5. Excellent oral hygiene.

Exclusion criteria-
1. Uncontrolled metabolic disease, compromised immune system, haematologic disorders, pregnancy, prior radiotherapy of the maxillofacial region, chemotherapy, bone disease, medication or any other systemic illness which may affect prognosis of the treatment.
2. Radiographic evidence of maxillary sinus pathology.
3. History of sinusitis or maxillary sinus surgery.
4. Inadequate mouth opening.
5. Patients with habits of smoking, tobacco chewing, alcoholism, etc.

Evaluation Criteria-
After 3 months follow up after surgery, the following parameters were assessed by CBCT.
2) Any pathological changes in maxillary sinus post surgery.
3) Local bone density of new bone formed at dental implant recipient sites.

Surgical technique-

Under LA, incision was placed, mucoperiosteal flap was raised and the anterolateral wall of maxillary sinus was visualised. Piezoelectric surgical unit with ultrasonic tip no. 679 was used for window preparation. The osteotomy wall was fractured, removed and kept in saline.Valsalva manoeuvre was performed to diagnose the integrity of the membrane. Drill hole for implant site was prepared using surgical stent and space created after the sinus membrane elevation was grafted using bioactive synthetic calcium phosphate bone graft material. The grafted site was closed with the bony window plate which was harvested at the time of window preparation.
In all cases, primary soft tissue closure was achieved using 3-0 silk or 3-0 vicryl suture. All patients were evaluated during the first week, first month, third month and sixth months post-operatively.

**RESULT-**

| Site | Pre-operative residual bone height(mm) | Residual bone height after 3 months of surgery(mm) | Gain in bone height( mm ) | Local bone density at dental implant site(HU) | Density of new bone at implant site(HU) |
|---|---|---|---|---|---|
| 1 | 3.50 | 11.40 | 7.90 | 510 | 430 |
| 2 | 2.80 | 10.75 | 7.95 | 806 | 650 |
| 3 | 3.75 | 12.50 | 8.75 | 756 | 630 |
| 4 | 1.80 | 10.50 | 8.70 | 541 | 470 |
| 5 | 3.80 | 12.75 | 8.95 | 652 | 550 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | 3.90 | 13.00 | 9.10 | 546 | 382 |
| 7 | 4.50 | 14.20 | 9.70 | 397 | 290 |
| 8 | 3.80 | 12.50 | 8.70 | 673 | 520 |
| 9 | 4.20 | 14.30 | 10.10 | 742 | 630 |
| 10 | 2.70 | 11.00 | 8.30 | 390 | 270 |
| 11 | 2.85 | 12.20 | 9.35 | 670 | 530 |
| 12 | 3.50 | 13.50 | 10 | 560 | 450 |

A total of 12 sinus floor augmentation procedure were performed in 10 patients. A total 21 implants were placed in these 10 patients. At the end of 3 months follow up there was significant increase in residual bone height. Correlation between age of patient and preoperative bone height was found as statistically non significant. P>0.05 Correlation between age of patient and gain in height was found to be statistically non-significant. p>0.05.

## III. DISCUSSION-

Loss of teeth causes accentuated bone deficiency, both in height as well as density due to significant resorption of alveolar bone. The most common type of bone in the edentulous posterior maxilla consist of D3/D4. Bone density less than 400 HU is associated with high risk of implant failure. Perforation of Schneiderian membrane, uncontrolled haemorrhage or displacement of implant into the maxillary sinus may occur during the sinus augmentation procedure. The prevalence of sinus membrane perforation is 20 % to 60% and occur mostly at sharp ridge lines, septa and spines. Collagen membrane should be used to close small tears in the Schneiderian membrane. The displacement of implants or grafts materials into the maxillary sinus results in a foreign –body reaction and causes serious complications such as maxillary sinusitis. The displaced implants must be immediately retrieved surgically.

A total of 12 sinus augmentation procedure were performed in 10 patients. The mean residual bone height pre-operatively was found to be 3.42mm (1.80-4.50mm). The pre-operative bone density was in the range of 603 HU (397-806HU). The post operative mean residual bone height was found to be 12.38 mm (10.50-14.30 mm). The post-operative bone density was in the range 483HU (323-585HU).

Total 21 implant were placed out of which 1 implant failed, success rate was found to be 96%.

## IV. CONCLUSION-

One stage direct sinus floor augmentation technique should be the treatment of choice when the height of residual bone is less than 5 mm in posterior maxilla.

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