

Direct Maxillary Sinus Lift Procedure (Lateral Window Approach)- A Review

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ABSTRACT

Open sinus lift is a type of pre-prosthetic procedure for expanding the quality and amount of bone in the posterior region of the maxilla. Proper radiographical diagnosis of the maxillary sinus is fundamental for the success of this procedure. The outcomes zeroed in on anatomic variations, vascular life systems, confusions, osteotomy/ostectomy window measurements and thickness of the Schneiderian Membrane. Unlike the feature's height and the width of the remaining alveolar ridge that ought to be assessed in preoperative CBCT incorporates the thickness of the lateral maxillary sinus, the presence of the alveolar antral artery and its diameter, the maxillary sinus floor width and angulation, abnormality of sinus floor, connection of Schneiderian layer with the underlying foundations of the adjoining teeth, sinus septum, and the nature of sub-antral bone. Different conditions that once in a while might be seen in uncommon circumstances are additionally clarified. At least ten parameters ought to be checked in assessing CBCT pictures of paranasal sinuses other than the width and the length of the remaining ridge in the back area of the maxilla.

KEYWORDS: Maxillary sinus, Direct sinus lift, schneiderian membrane, Lateral window approach.

INTRODUCTION:

In posterior region of the upper jaw, replacement of teeth in the edentulous ridge with dental implants requires lifting of the sinus membrane. If the measure of the bone, between the ridge and the maxillary sinus floor is insufficient, (<5 mm) at that point open sinus lift technique is indicated. CBCT is a primary indication before performing a sinus lift surgery^(1,2). CBCT gives a fair idea about the location, size and nature of the sinus. Also, Nunes et al explained that much more data can be acquired from CBCT other than the width and length of sub antral bone as clarified in this article. Complete intraoral assessment are vital tools in this regard. In any case, when CBCT is utilized for assessment of the maxillary sinus and the edentulous area, data obtained will be of the highest quality and accuracy when compared to radiographic method. Though CT is superior to CBCT the information required is mostly obtained from it⁽³⁾.

In recent times, placing dental implants in severely atrophied ridge is a challenging task. In Such atrophied ridges sometimes, the maxillary sinus is expanded and it needs to be lifted, this procedure can be done by various approaches

Two most common techniques are followed.

1. Direct sinus lifts

2. Indirect sinus lift

In direct sinus lift there is lateral window approach and in Indirect technique there is Osteotome sinus floor elevation, Bone added sinus floor elevation, minimally invasive trans alveolar sinus approach and antral membrane balloon elevation.

ANATOMY

The maxillary sinus is multi-functional which includes adding resonance to the voice, carrying out the olfactory process, warming and humidifying the inspired air and lightening of the skull⁽⁴⁾. Typically, in adults the maxillary sinus is a pyramidal-shaped bony cavity with its base at the lateral nasal wall and its apex extending into the zygomatic process of the maxilla. The sinus compartment is lined with a thin layer of mucosa and covered by a “ciliated” epithelium, and is continuous with the of epithelium of the nasal cavity.

In general, the mucosa of the maxillary sinus is thinner (about 1 mm thick) and its vascularity is less than that of the nasal mucosa. one of the major functions of a healthy ciliated epithelium is the transport function for mucous fluids towards the maxillary ostium, which forms a connection between the maxillary sinus and the middle meatus of the nasal cavity^(5,6). The sinus epithelium is derived from the cranial end of the middle meatus of the nasal cavity in the embryological stage. At around the 12th week of embryonic development, the sinus epithelium moves down with an Anterio-posterior extension. In children, the size of the maxillary sinus is almost nil and its insignificant till the development of permanent dentition. The development of maxillary sinus occurs by pneumatization and it increases in size till the end of adult growth period.

The size and shape of the maxillary sinus may vary significantly, even in the same individual at different period in growth. In adults, the usual dimensions of the maxillary sinus are approximated at 30 mm in width, 40 mm in height, and 40 mm in length. The sinus floor is present 1 cm beneath the nasal floor in adults. The maximum extension of the sinus may anteriorly be up to the canine/premolar region, with its deepest part reaching the first molar region^(7,8). So, it is evident that roots from the canine, and premolars to molars can easily open into the floor of the sinus. In elder people with atrophied edentulous alveolar ridge in the upper jaw, the maxillary sinus may enlarge to a significant variable only leaving a paper-thin cortical wall on its lateral side and bottom side of the oral cavity. The process sinus pneumatization differs in every person. The thin mucous membrane called Schneiderian membrane present within the sinus has a well vascularized blood supply. The terminal branches with anastomoses from the infraorbital artery, the posterior superior alveolar artery, and the greater palatine artery contribute to form the major blood supply to the maxillary sinus⁽⁹⁾.

PRESURGICAL ASSESSMENT

It is a very important aspect to assess the maxillary sinus before carrying out the procedure. Pre surgical CBCT helps in improving accuracy regarding the location, width of the sinus, window access to the sinus cavity. This technique sensitive procedure requires presurgical assessment to know the health status of sinus to reduce any operative complications^(10,11).

Features other than the height and the width of lingering alveolar edge that can generally be seen in CBCT are:

- a) Thickness of the sidelong maxillary sinus divider.
- b) Presence of alveolar antral course and its diameter.
- c) Maxillary sinus floor width.
- d) Abnormality of sinus floor.
- e) Any connection of Schneiderian layer with the foundations of the contiguous teeth.
- f) Maxillary sinus septum.
- e) Assessment of the bone/biomaterial volume required for sinus lifting.
- h) Assessment of the nature of subantral bone.

SURGICAL PROCEDURE

In order to create a safe access to the lateral sinus, a full-thickness mucoperiosteal flap from the mid-crestal area or slightly toward the palate is usually preferred, because if the sinus wall is thin and is in close proximity to the alveolar crest⁽¹²⁾. A releasing incision is given at the anterior or posterior edge of this flap with a slight flare so that there is appropriate blood supply from the base. In few cases, one anterior releasing incision is enough for access to sinus. Other important aspect is that the releasing incisions needs to be placed at a distance to the equal window site and position of the overlapping barrier membrane in case further access is necessary. The surgical procedure for sinus lifting is followed by the preparation of trap door from the lateral sinus wall to elevate the Schneiderian membrane. After the full exposure of the lateral maxillary wall, an antral opening is made in the lateral sinus wall in order to gain access into the sinus membrane. Opening of the trap-door window can be done either using rotary or the piezoelectric technique which will provide adequate access to obliterate the thin to thick cortical bone and will expose the thin sinus membrane, thereby creating a space to place the bone graft material⁽¹³⁾. The membrane is then elevated along the whole sinus floor and above the medial wall at the level of the proposed graft placement. This elevation must extend antero-posteriorly so that the exposed sinus floor can allow the placement of grafts followed by implant. The elevation of sinus space created below the lifted sinus membrane is then grafted with different fillers consisting of bone substitute, autogenous bone or a mixture of these materials. Inshort, implants can be placed with a minimal bone height of 4 to 5 mm for primary stabilization during the grafting procedure immediately or can be placed after a primary healing period of 9 to 12 months which will permit bone regeneration. The wound of the raised flap is then closed with suturing to avoid any exposure of the graft or the implant^(14,15,16). In the next stage of implant exposure, a partial thickness mucoperiosteal flap over the ridges crest is placed to prepare a safe zone of palatal keratinized epithelium can be raised and laterally positioned toward the buccal in order to preserve a keratinized zone of mucosa on the periphery of implant emergence area.

CONCLUSION

Sinus lift procedure being a blind treatment needs a lot of experience, skill, advanced technology to avoid failure. In india there are different kinds of myth regarding only exodontia and also lack of technology in various clinical environment results in less exposure in such kind of procedures. None the if the procedure is rightly explained to the patients, it can improve the quality of life of the patients and also a better oral environment when compared to uneasiness when placed with prosthetic equipment. Though there will be little pain and swelling for a few days but will be worth it all when its healed.

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