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The Gold Standard Technique for Maxillary Sinus Lift Surgery

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Background. Maxillary sinus floor elevation is one of the most common reconstructive surgical procedures performed on the facial skeleton. This study evaluates an optimized technique for reconstructing the lateral sinus wall using an autogenous connective tissue graft (CTG) as a barrier membrane. **Objective.** To optimize the technique for reconstructing the lateral sinus wall during bone augmentation of the posterior alveolar ridge. **Methods.** Ten patients underwent open sinus floor elevation between 2015 and 2020, with retrospective radiographic analysis. **Results.** All ten procedures were successful, with favorable long-term clinical and radiographic outcomes. **Conclusion.** An autogenous CTG is confirmed as a reliable barrier membrane for bone-window closure in open sinus lift surgery.

Keywords: *maxillary sinus lift, connective tissue graft, barrier membrane, subantral augmentation, dental implant*

1. Background

Maxillary sinus floor elevation is one of the most common reconstructive surgical procedures performed on the facial skeleton. According to international statistics, partial or complete edentulism in the maxillary molar region affects approximately 20% of individuals aged 18 and older. Furthermore, in more than half of cases involving dental implant placement in the posterior maxilla, preliminary subantral augmentation is required [1]. In 1974, Dr. Hilt Tatum proposed the original technique for sinus floor elevation and localized bone grafting [2]. Modern surgical methods aimed at elevating the sinus floor to increase bone volume for implant placement are modifications of this pioneering technique.

One such modification in open sinus floor elevation involves the placement of a barrier membrane to isolate the augmented maxillary sinus from the overlying soft tissues. However, there are conflicting views in the literature regarding this approach. Several specialists consider the use of barrier membranes unnecessary provided that periosteal integrity is maintained. While the periosteum is known to positively influence bone regeneration, it fails to protect against pneumatic pressure within the maxillary sinus, which can potentially displace a portion of the augmented material from the cavity [3].

Consequently, numerous types of barrier membranes have been developed. Among the most widely used are bovine tendon-derived membranes (e.g., Cytoplast RTM Collagen), which are composed of connective tissue rich in collagen fibers. This material offers multiple advantages regarding tissue healing and stabilization. Collagen fibers activate osteoblasts, thereby stimulating osteogenesis. Nevertheless, the primary disadvantages of this material remain its xenogenic origin and high cost [4].

2. Objective

The aim of this study was to optimize the technique for reconstructing the lateral sinus wall during bone augmentation of the posterior alveolar ridge.

3. Materials and Methods

Between 2015 and 2020, maxillary sinus floor elevation procedures were performed, followed by retrospective analysis based on digital orthopantomograms. Prior to the surgery, all patients underwent professional dental cleaning and were instructed to use a preoperative oral rinse. Light intravenous sedation was administered. Following facial antisepsis, the surgical field was isolated using sterile drapes. Local anesthesia was achieved using articaine with epinephrine.

The incision line was placed palatally along the crest of the edentulous posterior alveolar ridge. A vertical releasing incision extending 0.5 cm onto the buccal side was added. In some cases, to improve access to the lateral wall of the maxillary sinus, the crestal incision was connected to a sulcular incision,

extending around the cervical areas of the premolars. A full-thickness mucoperiosteal flap was then elevated. A bone window was created in the lateral wall of the maxillary sinus, and the Schneiderian membrane was carefully elevated, followed by bone augmentation and dental implant placement. In the subsequent stage, the bone window was covered using an autogenous connective tissue graft (CTG) as a barrier membrane [5,6,7].

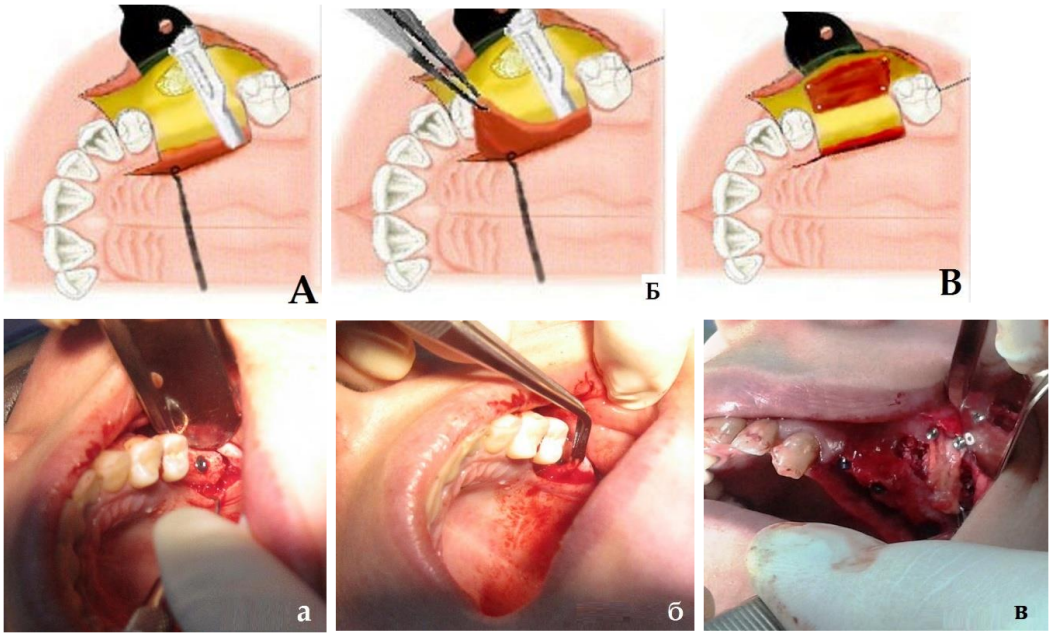


Figure 1. Application of an autogenous connective tissue graft (CTG) as a barrier membrane in open sinus floor elevation. (A, B, C) schematic stages of harvesting the autogenous CTG; (a, b, c) clinical photographs of the CTG placed to cover the bone window in the lateral maxillary sinus wall.

The bone window was measured preoperatively to determine the required size of the connective tissue graft (CTG). An incision was made from the previously incised palatal margin to split the epithelial layer from the underlying connective tissue. Subsequently, a CTG of the appropriate dimension was harvested. Following surgical processing of the CTG, it was fixed to cover the bone window. Stabilization was achieved using either titanium pins or 5-0 monofilament sutures (Monosyn/Monocryl), after preparing micro-holes in the lateral maxillary sinus wall adjacent to the created bone window. The mucoperiosteal flap was then repositioned and secured with a two-layer suturing technique.

4. Results

A total of 10 patients with a mean age of 45 years were operated on. All surgical procedures were performed under intravenous sedation. Digital orthopantomograms (OPGs) were obtained preoperatively and postoperatively. At 5 to 6 months post-surgery, a comparative analysis was conducted to evaluate the remodeling level of the augmented bone grafted with a mixture of xenogeneic and autogenous biomaterials.

Blending of the border between the augmented bone and the maxillary sinus floor was observed. Based on these favorable radiographic outcomes, definitive prosthetic treatment was successfully performed. A retrospective radiographic analysis covering a follow-up period from 2 to 8 years was also conducted. Clinically and radiographically, no regressive changes in soft or hard tissues were observed in any of the patients.

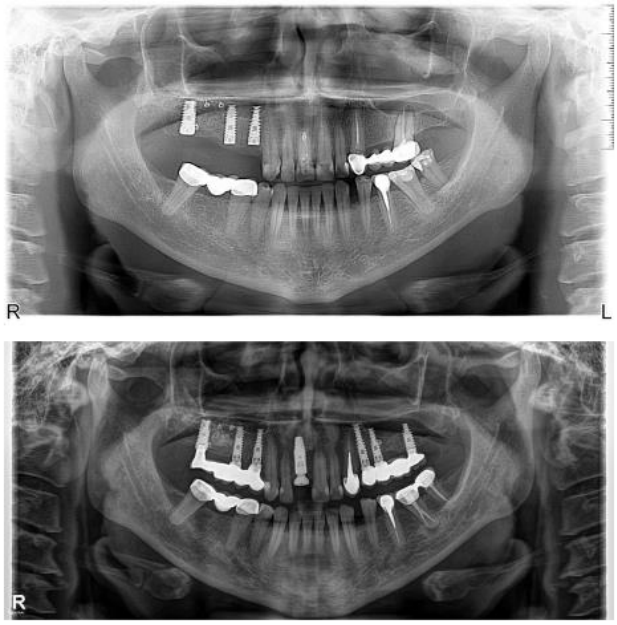


Figure 2. Immediate postoperative view (2015) and follow-up radiograph (2024) demonstrating stable augmented bone volume.

5. Conclusions

A total of ten surgeries were performed using this technique, all yielding successful outcomes. Clinical and radiographic evaluations demonstrated highly favorable long-term results. The proposed technique—involving the harvesting of an autogenous connective tissue graft (CTG) from the hard palate and its subsequent application as a barrier membrane to cover the lateral bone window during maxillary sinus floor elevation—proved to be highly effective. This efficacy is further supported by the data from the 6-month postoperative follow-up of patients treated with this method. In conclusion, the clinical utility of an autogenous CTG as a reliable barrier membrane for bone window closure in open sinus lift surgeries is fully confirmed.

References

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