

# CLINICAL ANALYSIS OF MORE THAN 130 CASES OF MAXILLARY SINUS LIFT

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**Keywords:** sinus lift, bone augmentation, immediate insertion postextractional, bone splitting, bone condensing, loading implants

**Abstract:** Sinus lift surgery is one of the most diverse maxillo-facial surgical procedures: there are numerous ways to approach the maxillary sinus; there is a wide variety of bone augmentation materials; may be associated with other surgical techniques preprotetics; the insertion of implants may be immediate, delayed, or late, depending on the initial bone height. The aim of this study is to demonstrate the variety of procedures and technical means, in relation to clinical outcome after sinus augmentation in 131 cases. The sinus augmentation in 131 interventions were performed on 89 patients (average age 49 years (24-67)). EIGHT preoperative and postoperative examination was mandatory for all patients and difficult cases were examined by computed tomography (CT). Survival of implants when evaluated after a loading integration success was compared between: different augmentation materials; smoking, nonsmoking; various postoperative complications; Immediate insertion / late implants. Time to prosthetic loading was assessed according to different groups of bone augmentation material. All 228 of screw type implants were inserted and TPS surface only in the augmented posterior maxillary sinus lift techniques. Ridge height was evaluated preoperatively between  $6.59 \pm 2.11$  mm (4.5 and 8.5 mm). After ridge augmentation average height reached between  $14.57 \pm 2.33$  mm (12.5 and 16.9 mm). Period prospective and retrospective study lasted 5 years and after a mean of 3.1 years (range 1-6 years) survival rate of implants was 97.2% 98.91%. We found minimal differences between the different bone grafts, and Co-morbidity associated with smoking habits. This retrospective study can be concluded that: sinus augmentation surgery is the most versatile procedure; translated by predictability and effectiveness of implant survival rate is very high and independent in relation to graft bone, surgical technique, complications, smoking and immediate or delayed insertion of implants; addition of autogenous bone mixed with alloplastic augmentation materials require less time to prosthetic loading.

**Cuvinte cheie:** sinus lifting, augmentare osoasă, inserția postextracțională imediată, bone splitting, bone condensing, încărcarea implanturilor

**Rezumat:** Intervenția chirurgicală de sinus lift este una dintre cele mai diversificate proceduri chirurgicale maxilo-faciale: există numeroase căi de abordare ale sinusului maxilar; există o mare diversitate a materialelor de augmentare osoasă; se poate asocia și cu alte tehnici ale chirurgiei preprotetice; inserția implanturilor poate fi imediată, întârziată sau tardivă, în funcție de înălțimea osoasă inițială. Obiectivul acestui studiu este de a demonstra această varietate de proceduri și mijloace tehnice, în raport cu rezultatele clinice în urma augmentării sinusului în 131 de cazuri. Cele 131 de intervenții de augmentare sinusală au fost realizate pe 89 de pacienți (cu vârstă medie 49 ani (24-67)). Examenul OPT preoperator și postoperator a fost obligatoriu pentru toți pacienții, iar cazurile mai dificile au fost examinate prin computertomograf (CT). Rata de supraviețuire a implanturilor evaluată la momentul integrării și după o încărcare reușită, a fost comparată între: diferite materiale de augmentare; fumători/nefumători; diferitele complicații postoperatorii; inserția imediată/tardivă a implanturilor. Timpul necesar pentru încărcarea protetică a fost evaluat în funcție de diferitele grupuri de materiale de augmentare osoasă. Toate cele 228 de implanturi de tip șurub și suprafață TPS au fost inserate exclusiv în zona maxilară posterioară augmentată prin tehnici de sinus lift. Înălțimea crestei evaluate preoperator a fost între  $6,59 \pm 2,11$  mm (4,5 și 8,5 mm). După augmentare înălțimea medie a crestei a ajuns între  $14,57 \pm 2,33$  mm (12,5 și 16,9 mm). Perioada studiului prospectiv și retrospectiv s-a întins pe 5 ani, iar după o perioadă următoare medie de 3,1 ani (interval de 1-6 ani) rata de supraviețuire a implanturilor a fost de 97,2% - 98,91%. Am constatat diferențe minime între diferitele grefe osoase, comorbiditatea asociată și obiceiurile de fumat. La baza acestui studiu retrospectiv, pot fi concluzionate următoarele: Operația de augmentare sinusală este cea mai versatilă procedură; predictibilitatea și eficacitatea tradusă prin rata de supraviețuire a implanturilor este foarte înaltă și independentă în raport cu greșa osoasă, cu tehnica chirurgicală, complicațiile asociate, fumatul și inserția imediată sau tardivă a implanturilor; aportul de os autogen în amestec cu materiale de augmentare aloplaste necesită mai puțin timp pentru încărcarea protetică.

## INTRODUCTION

The technique of "sinus lift" is to increase vertical

alveolar ridge of the rear jaw by interposing different types of bone graft between membranes Schneideriană then elevated off

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the floor and maxillary sinus. In a subsequent stage or in the same session with floor augmentation will be possible to place implants osseointegrated screw predictable opportunities.

Procedure for dealing with sinus through the lateral wall was acquired in 1976 Cadwell-Luc and Tatum describes the lifting of the floor by transplantation of iliac crest bone block. Boyne and James perfected this technique and in 1980 became one of the most used surgical techniques used in implantology preprotetică. Diversity allogeneic bone augmentation materials and xenogeneic, design and surface treatments of implants diversified ways of dealing with posterior maxillary area. So the approach addresses Summers sinus floor by floor sinus osteotomy endobucală the alveolar ridge 'internal sinus lift. "Sinus lateral wall approach itself can be made with several types of instruments:

- diamond cutters 1.5-2 mm diameter ball mounted right track in average speed (1500-2000 rev / min) and saline cooling in the refrigerator side window shape voucher;
- diamond spherical heads mounted active arm the device to bone piezochirurgie
- Razu piezochirurgie device that creates a side window without bone flap, but an opportunity to recover bone powder.

Rehabilitation of atrophic maxillary posterior portion of the implants is a challenge to a maxillo-facial surgery. Posterior maxillary ridge height may be compromised because of increased pneumatizării resorptions sinus or because they are accelerated alveolar ridge after tooth extraction, trauma or concomitant pathology of the region. Moreover, the posterior maxillary bone density is usually group III or IV after Misch. The average height of 10 mm is required for placing implants to be successful and predictable. If atrophy, maxillary sinus lift is an excellent option terapeutică.

Addition bone material can be of several types:

- Registry as recolatat autologous bone block in the mouth (jaw or tuberozitară retromolară area), or in areas extraorale (Calvi or iliac crest)
- Allogrefe;
- xenogeneic grafts, with predilection bovine bone graft (Bio-Oss)
- Synthetic Grafts;
- Alloplaste (Cerasorb)
- Combinations of these (30% xenogeneic graft granular sawdust and 60% autogenous bone, autogenous graft bone block and granular sawdust xenogeneic bone ).

The combination of specific techniques to approach the maxillary sinus (Boyne and James technique or Summers) with other techniques:

- the ridge splitting technique with bone chisels, piezoelectric scalpel or association with classical instrumentation at piezochirurgial
- technique using lateral osteocondensare osteotoamelor;
- graft apposition technique "onlay" when the sidewall of the ridge is resorbed.

These techniques can be applied all in one session or the successive sessions after previous graft maturation (eg application of onlay graft, 2-3 months after sinus floor augmentation implant insertion and then after another 4-6 months). Demonstrating the versatility of this technique surgery preprotetică ending when inserting implants: according to the original height of the ridge can insert implants simultaneously with surgery, sometimes postextracțional or a later stage.

### PURPOSE OF STUDY

The purpose of this study is to present a prospective

analysis of 131 procedures were Our sample was made to show the relationship between different parameters affecting the success rate of implants.

### METHODS AND MATERIALS

This series is based on 131 operations performed maxillary sinus lift between 2006 and 2009 on 91 patients in the Ambulatory Clinical Military Hospital Specialty Alexandru Augustin "Sibiu Oral Implantology Department. The mean age of patients was 49 years (from 24-67). All patients had atrophy of the ridge level of the posterior maxilla. Various data were obtained before surgery: smoking habits, periodontal disease (clinically diagnosed), or systemic disease. This procedure was contraindicated only in patients with active sinusitis treatment with bisphosphonates. Pre-and postoperative radiological control was made with panoramic radiographs and CT's. Prosthetic rehabilitation was achieved by a fixed prosthesis or implant prosthesis implant.

Protocol sinus lift surgery: antibiotic prophylaxis was achieved in all patients consisting of a dose of 1000 mg amoxiclav (1 tablet at 8 o'clock the first 2 days, 5 days 12 hours 1 TB) from the day before surgery and continuing 7 days after surgery. Patients who are allergic to penicillin were prescribed 300 mg of clindamycin (1 to 8 hours) for the same period of time. 76.2% of procedures were performed under local anesthesia with 1% strength ubistezin (1:100,000)., Potentiated by diazepam, while 23.8% of patients received general anesthesia, surgical technique was described in sinus lifting various studies. The approach undertaken in all cases studied was antrostomia side or Caldwell-Luc. The procedure was performed only in the above. The window can be made with or without bone flap preservation voucher when Razu use of bone for bone Collecting sawdust. (Fig. 1,2,3)

**Figures no. 1. and 2. Creating voucher bone with bone voucher keeping diamond cutter (left) or without preserving bone voucher (right)**



**Figure no. 3. Create the window using the sinus end of the device OT1 piezochirurgial**



Sinus membrane is carefully using lifts off membranes and then graft is placed between the membrane and alveolar bone remaining. (Fig. 4,5,6).

Intraoral autogenous bone graft placed include (maxillary tuberosity, the lateral wall of the maxillary sinus), extraoral autologous bone (anterior and posterior iliac crest, the ordeal), and a combination of autologous bone and xenogeneic bovine bone (Bio-oss). In cases requiring a greater breadth of bone, were used and other procedures such as Opozitia "onlay" bone graft and osteotomy by splicing. Narrow alveolar ridges were cleaved with piezoelectric instruments and / or class. (Fig. 7,8)

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Figures no. 4. and 5. Take off sinus membrane by classical methods using classical instruments (left) and modern Implantium Company (Seoul, Korea), (right)



Figure no. 6. Sinus membrane off using modern equipment piezochirurgie



Figures no. 7. and .8. Placement of granular bone graft after off schneideriene membrane.



Implant insertion is performed simultaneously when the original height of the ridge is at least 6 mm. A total of 228 screw implants (Wital - TPS surface and acid etched, Semados - SLA surface, Implantium - TPS surface) were placed in elevated areas. All patients were assessed one week after surgery and then monthly. Waiting for prosthesis placement was at least 3 months. Monitoring patients with a radiologic examination begins immediately postoperator parallelism control implants and their relationship with the maxillary sinus, an exam the day after surgery and two weeks for removal yarns. Patients were evaluated at one month, three months then six months for prosthetic loading.

### Analysis of statistical criteria

The following parameters were evaluated for the descriptive study: alveolar crest bone height before and after intervention (by orthopantomograms radiographic examination and CT), smoking habits (smoking), Co-morbidity (periodontal disease, systemic disease, and priority oral carcinoma), type of anesthesia (general or local), type of bone graft (iliac crest earlier tuberosity maxillary sinus lateral wall, or xenogeneic bovine bone combined with autologous bone), surgical procedures associated preprotetice (Opozitia grafts on vestibular wall of the ridge, bone condensing, by splitting osteotomy), types of surface coatings of implants (TPS, SLA, TPS and acid etching), when placing implants (simultaneous or delayed) when the extraction and insertion of implants (extraction and curettage followed by 2 months of waiting, extraction and sinus augmentation and insertion alveola with two-stroke extraction and sinus floor augmentation and immediate insertion postextractional) and type of prosthetic rehabilitation used (prosthetic superstructures to support only fixed by cementing

implants, prosthetic superstructures to support joint implant and natural teeth, with support superstructure implanto mixed-mucositis - overdenture). success rate of implants and prosthetic restoration waiting time (in months) were set as dependent variables Our statistical analysis. Success rate was calculated for each sinus lift using the formula (number of implants inserted / number of implants lost). The main variable that determines the other parameters is represented in the analysis with the implant.

## RESULTS

### Descriptive study sample

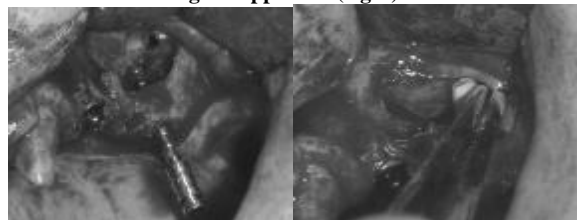
The mean preoperative height of the sinus floor was  $6.59 \pm 2.11$  mm and postoperative height was  $14.57 \pm 2.33$  mm. 71.4% of sinus lift operations were performed on healthy patients, while 11.3% were performed on patients with various systemic diseases, 15.8% were suffering from periodontal disease. 80.21% of procedures were performed on patients who were never smokers and smokers 19.78%. Bone graft was harvested from the lateral sinus wall using piezoelectric Razus 15% of cases, previous iliac crest 10.5% of maxillary tuberosity in 2% of cases and ultimately a combination of autologous bone and xenogeneic bovine bone in 73.4% of cases.

Opozitia onlay bone grafts were incorporated in 41.66% of cases, by splitting osteotomy was used 55.55% of cases. Simultaneous implant placement was 64.7% and 30.8% of cases delayed by a waiting period (in months) for implants at 5 to 8 months. In 84.2% of cases were not signs of complications. The most common complication was rupture of membranes (10.1%). This percentage is similar to that published by Wallace et al. Zijderveld. Alte complications such as: sinusitis (3.7%) and communication orosinusală (0.9%). (Fig. 9.10) 95% of patients achieved complete rehabilitation on implants (91.3% with fixed prosthesis on implants and 3.7% by prosthetic implanto-mucositis), overall success rate of implants being 96.91 %.

Retrieving requiring autologous bone near the donor which increases morbidity procedure especially when the donor is extraorală. On the other hand, retrieval of autologous bone from intraoral locations we provide enough graft for cases with severe maxillary atrophy.

Should be noted that the experience gained in this series use piezo scratch when we make a sinus lift offers significant technical advantages. Creating window is quick and very careful because it allows an excellent view of the membrane, which is particularly useful when intrasinusale septa. It will state the reasons and criteria used when deciding the type of graft insertion. The increased resorptions (0-5 mm after Misch) and resorptions plus cross the posterior maxillary ridge was used autogenous grafts harvested from iliac index or retromolar bone block, but to avoid interference with general anesthesia have preferred intraoral bone grafts. In resorptions moderate (5-8 mm after Misch) I turned to graft xenogeneic bovine bone mixed with autologous bone sawdust.

Figures no. 9 and 10. Perforating the sinus membrane (left) and immediate surgical approach (right)



Waiting time (months) to achieve protezării was compared according to graft origin. The results were: iliac crest anterioaraă: 6.5 months (range 5.5-10.5), lateral wall sinus: 4.5

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months (between 3.5 and 4.5); tuberosity maxilla: 4 months (ranging from 3.5-4.5) and combination of xenogeneic bovine bone and autologous bone: 7.5 months (range 5,5-12,5). The difference between using only autologous bone and use combination of bovine bone and autologous bone is significantly ( $P < 0.01$ ). When comparing these variables in accordance with various origins of autologous bone are significant differences between the iliac crest autologous bone and other backgrounds (maxillary tuberosity and jaw wall) ( $P < 0.01$ ).

### DISCUSSION

The placement of implants in the molars and premolars in upper jaw can become difficult due to lack of ridge height. Maxillary sinus lift operation proved to be a predictable clinical procedure which makes it possible to placing implants in such cases. This study examines a series "unicentric" the many sinus lifts published in the literature. Results that we collected on implant survival was excellent, with an overall success rate (96.91%) is higher than those reported by other series. Statistical analysis shows that this rate does not depend on the type of graft used, the presence of comorbidities and smoking habits. In contrast to other studies, smoking does not have an adverse effect in these patients. However, heterogeneous and asymmetric distribution of independent variables made using non parametric statistical test required for analysis. This factor should be considered when interpreting the results.

Comparing the success rate of implants placed simultaneously and late (average  $98.65\% \pm 7.57$  and  $93.57\% \pm 16.43$  respectively) are statistically significant differences favoring the simultaneous placement. However, because both the average rate is very high do not believe that this difference is clinically relevant.

### CONCLUSIONS

Sinus lift technique is a predictable, reliable and versatile allowing implant prosthetic rehabilitation of the posterior maxillary hypoplasia. Survival of implants that reach very large and depends on the type of graft used, associated morbidity or smoking habits. Using a combination of inorganic bovine bone with autologous bone leads to success rates similar to the exclusive use of autologous bone but takes longer to achieve prosthetic. Scratch using sinus bone for carving window has many technical advantages.

Intervention maxillary sinus lift and elevation off concerns Schneideriene membrane, which is really just the first step in sinus grafting. Introducing with bone graft or autogenous or other origin of a technical talk of raising the sinus floor bone (sinus floor augmentation). OPT and radiographic examination is mandatory examination by CT for preoperative evaluation of possible anatomical deformity (partial or sinus septa total), or the existence of sinus pathology (cysts, polyps, tumors). With the insertion implant is a second phase in addition to radiographic examination EIGHT CT examination is recommended for precise determination of graft size and quality of residual bone endosinusale neofomat. Without a doubt, the hospital where such operations were performances of these studies have enabled accurate, evading, among other things, economic cost and the amount of radiation received by patients.

General anesthesia is necessary when extraorale grafts harvested from locations such as iliac crest or hell. Indicates miniminvasive collection instruments represented by piezo devices. Membrane rupture cases were caused by the use of classical instruments represented by diamond cutters, or during take-off sinus membrane with classical instrumentation. This information is relevant when we draw conclusions on the data. Insertion of implants simultaneously with sinus floor grafting is

permitted when bone height is at least 5 mm, or when cortical bone is compact and provides primary stability of implant. Certainly in implantology implant survival rate is guaranteed for primary stability and less augmentation material used or the type of implant used. Also, when we place implants simultaneously with augmentation, in addition to the importance of preoperative alveolar height, density and quality of residual bone crest is crucial. Hence the importance of preoperative CT examination. I propose a study of CT examinations postoperatively neofomat bone quality assessment, the degree of graft and resort ridge resorption and bone periimplantar. Certainly the data would be worse in smokers.

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