

CASE REPORT

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Minimally Invasive Antral Membrane Balloon Elevation (MIAMBE): A 3 cases report.

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Abstract: Long-standing partial edentulism in the posterior segment of an atrophic maxilla is a challenging treatment. Sinus elevation via Cadwell Luc has several anatomical restrictions, post-operative discomfort and the need of complex surgical techniques. The osteotome approach is a significantly safe and efficient technique, as a variation of this technique the "minimal invasive antral membrane balloon elevation" (MIAMBE) has been developed, which use a hydraulic system. We present three cases in which the system was used MIAMBE for tooth replacement in the posterior. This procedure seems to be a relatively simple and safe solution for the insertion of endo-osseous implants in the posterior atrophic maxilla. **Keywords:** "Dental Implants"[MeSH], "Sinus floor augmentation"[MeSH], balloon.

Elevación mínimamente invasiva mediante globo de la membrana antral (MIAMBE): Presentación de 3 casos clínicos.

Abstract: El edentulismo parcial de larga data en el segmento posterior en un maxilar atrófico supone un reto terapéutico. La elevación de seno vía Cadwell Luc presenta restricciones anatómicas, incomodidades post-operatorias y la necesidad de técnicas quirúrgicas complejas. El enfoque con osteotomos tiene una eficacia y seguridad considerable, como una variación a esta se ha desarrollado la "elevación mínimamente invasiva mediante globo de la membrana antral" (MIAMBE), que utiliza un sistema hidráulico. Se presentan tres casos en los que se utilizó el sistema MIAMBE para el reemplazo de dientes en el sector posterior. Este procedimiento parece ser una solución relativamente sencilla y segura para inserción de implantes endo-óseos en el caso de un maxilar atrófico posterior. **Palabras clave:** Implantes dentales, elevación sinusal, globo.

Introduction.

The surgical insertion of endosseous implants in posterior atrophic ridges in the upper jaws is a therapeutic challenge because of the frequent sinus pneumatization. Sinus floor augmentation has become a predictable and effective in increasing the vertical dimension of atrophic posterior maxillary alveolar bone¹. However, this approach takes time, costs, may have negative consequences for patients, and raises the risk of numerous complications. The maxillary Sinus floor augmentation with open technique Caldwell-Luc approach is being performed increasingly less frequently, anatomical restraints and complexity of surgical skills have given way to the development of new techniques². A simpler and less invasive version of the sinus lift technique with osteotomes has been developed.

Maxillary sinus augmentation with a balloon is described for the first time through conventional lateral approach and a hemostatic balloon³. It was experimentally observed in sheeps that the pressures needed for the lifting of the Schneider's membrane were considerably lower applying hydraulic pressure compared to the pneumatic pressures, the explanation is the property of gases to be compressible⁴. This is how minimally invasive antral membrane balloon elevation (MIAMBE) system was developed, using hydraulic pressure through a hypoallergenic silicone balloon, this method has been reported in the literature as an the simpler and atraumatic technique alternative to the conventional technique⁵.

Kfir *et al* design their own device to the same effect and baptized as MIAMBE technique (Minimally Invasive Antral Membrane Balloon Elevation). They presented a series of 24 cases in 2006², one of 36 cases in 2007⁶ and 112 cases 2009⁷, obtaining a success rate of approximately 95% at 6 months, an average bone height gain of 10 mm and a procedure time of about 60 minutes⁸.

The following clinical presentation illustrates the use of the MIAMBE technique through three clinical cases demonstration in which the system MIAMBE (Miambe LTD, Israel) was used for the surgical insertion of dental implants in relation to the maxillary sinus.

Procedure.

The surgeries were performed under local anesthesia (2% mepivacaine with 1:100,000 epinephrine). A full-thickness mucoperiosteal flap was raised to expose the alveolar ridge. The initial preparation was performed with a round bur with an atraumatic tip floor and maxillary sinus bone was drilled with a 1mm accuracy. Then, was inserted a special chisel with special pike and punched gently to produce a controlled fracture of the cortical layer of the sinus. Subsequently was checked the Schneider's membrane integrity. It was performed the lift of Schneider's membrane and inserted the ballon of MIAMBE system to produce controlled elevation of the sinus membrane. With a bone carrier it was inserted autologous bone graft

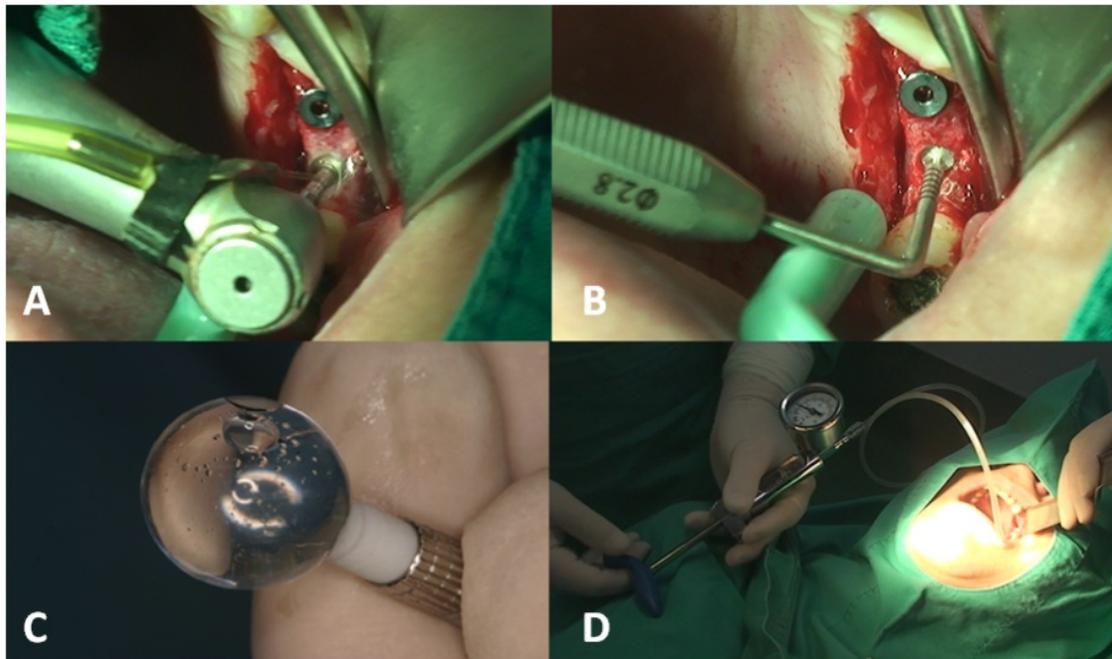


Figure 1: A. Round bur atraumatic tip. B. Osteotome for sinus floor fracture. C. Balloon of the MIAMBE system. D. Evaluation of the balloon pressure.

(obtained from milling) and lyophilized bone (Xenograft, Alphabio, Israel), then was proceed to close the wound or to insert endosseous implant as needed (Figure 1).

Dental implants were placed in the same surgical step when we had a 2 mm or more of residual alveolar bone thickness. In cases where the implant was not placed in the same surgical procedure, was waited three months to allow consolidation of the bone graft previous to placement of the implant. The day before surgery , all patients received Amoxicillin - clavulanate 500/125 mg. every 8 hours for 7 days , Meloxicam 15 mg. every 24 hours for 4 days , and chlorhexidine 0.12 % rinses three times daily for 7 days.

Cases report.

Case 1: Male patient, 38 years old, no morbid history. Complained about losing the tooth 2.5 more than 5 years ago. Radiographic exam showed a marked pneumatization of the maxillary sinus with cortical thickness of approximately 3 mm. We planned and performed a sinus lift using MIAMBE system and proceeded to the immediately insertion of a cylindrical implant of 16 mm. long and diameter of 3.75 mm. (ATID, Alphabio, Israel). Postoperative control were performed 24 hours later, one week later, then once per month, in the following postoperative controls patient reported no pain and there was no facial edema or signs of infection or bleeding. Radiograph was performed immediately and 6 months later. Retention was observed

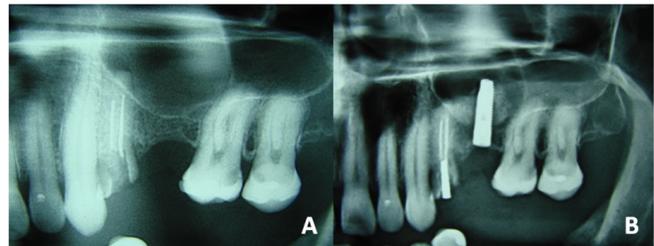


Figure 2: A. Preoperative radiographic evaluation. B. Radiographic control 6 months later.

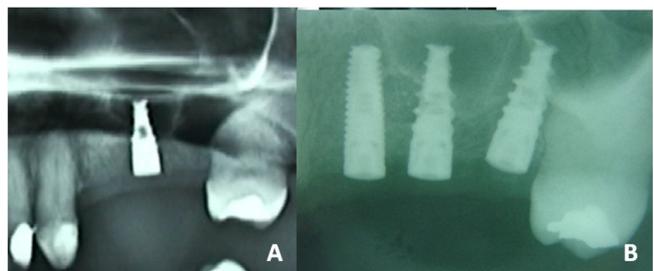


Figure 3: A. Preoperative radiographic evaluation. B. Radiographic control 6 months later.

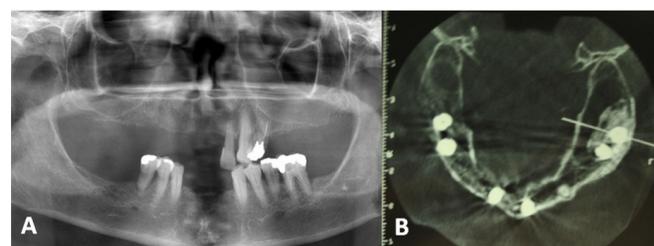


Figure 4: A. Preoperative radiographic evaluation. B. Computed tomography 6 months later.

bone graft around the implant and clinically secondary stability. Radiographic check ups were performed immediately and 6 months later as is showed in Figure 2.

Case 2: Female patient, 58 years old, controlled diabetes, presented an edentulous ridge in relation to tooth 2.4-2.5-2.6 and an implant of 13 mm long by 3.75 mm in diameter (SPI, Alphabio, Israel) in the 2.5 tooth, previously placed. The maxillary sinus floor presented a cortical layer of approximately 3 mm. We planned and performed the maxillary sinus lift technique MIAMBE and the immediate insertion of an implant 13 mm. by 3.75 mm. in diameter (SPI, Alphabio, Israel). Then we wait 3 months and placed an implant of 3.75 mm. diameter by 13 mm. long (ATID, Alphabio, Israel) in the area of the 2.4 tooth. Follow up was performed at 24 hours and one week later, then 1 per month, in the following postoperative controls patient reports no pain and facial edema is not seen, no sign of infection or bleeding was showed. Radiographic check ups were performed immediately and 6 months later where it was observed retention of the bone graft as is show in Figure 3.

Case 3: Female patient, 63 years old, controlled diabetes and hypertension, partialy edentulous maxilla with 2.1-2.2-2.3 teeth remaining, and cortical sinus floor thickness of 2 mm. MIAMBE technique was performed and implants of 13 mm. long by 3.75 mm. diameter (SPI, Alphabio, Israel) were placed on the area of 1.4-1.5-2.5 teeth and in the area of 2.4 tooth an 13 mm. long by 3.75 mm. in diameter (ATID, Alphabio, Israel) implant was placed. 3 months later, two implants of 13 mm. diameter by 3.75 mm. (SPI, Alphabio, Israel) were placed in 1.1 and 2.1 tooth. Check ups after 24 hours and one week later were performed, then once per month, the following controls in the patient reported no postoperative pain and facial edema was not observed also no signs of infection or bleeding. Radiographic check ups were performed immediately and 6 months later where it was observed retention of the bone graft as is show in Figure 4.

Discussion.

When we historically analyse since Tatum classic approach accessing via lateral sinus, new techniques have been developed to overcome the difficulty of lift Schneider's membrane without tearing it and preserve as much as possible bone¹. Thus, Summers in 1994 describes the transalveolar technique that elevates sinus membrane through progressive sizes of osteotomes and achieved it with minimal bone loss and reducing the risk of perforation¹. A lot of modifications have emerged to complement this technique, including

Muronoi's technique, in 2003 he describes the first elevation of the sinus mucosa through a ballon, in order to minimize the possibility of tearing³. In 2006 Kfir *et al*/modified this new technique with attachments that allow tightly control of pressure and the amount of saline to be added to the system in a progressive manner, in order to make the technique more predictable and safe⁴.

MIAMBE technique has proven to be a rapid, effective and safe, with success rates close to 95 %, gain in bone height of about 10 mm. and reduction of precEDURE time to approximately 60 minutes operatory time^{1, 2, 6-11}. It was found that the maxillary sinus augmentation with balloon systems present minimal postoperative discomfort and pain, resulting in patient comfort and reduction of analgesic use¹²⁻¹⁴.

In a review of the literature, different techniques of sinus floor augmentation were compared and concluded that balloon lifting system is considered which achieves greater gain in height and homogeneity of grafts¹⁴⁻¹⁶, requires minimal amounts of bone graft and don't require membranes, which means a saving for the patient¹⁷. MIAMBE system unlike the conventional techniques can be used with minimum thickness sinus floor^{17, 18}.

The benefits and advantages are obvious, retrospective study of eight years using the hydraulic lift sistem reported in 1100 patients¹⁸ a success rate of 99%, only 8 implants failed. In interconsultation with otolaryngologists, improvement of sinus problems were related, such as headaches, breathing improvements, better drainage, and removal of sinus pressure.

Hydraulic pressure and flexible bone graft, used together may dissect soft tissues of the sinus floor bone without perforation risk. The strict use of drills and osteotomes prevents surgical intrusion or perforation¹⁸.

However, some limitations should be considered, the presence of not reusable attachments, specific equipment and the need for special training may increase considerably the cost of the procedure resulting in a more expensive treatment for the patient.

Conclusion.

Given the need for maxillary sinus lift, this relatively new technique seems to be simple and safe, but we should be always aware the limitations and the specific indication in posterior maxilla and those restraints of for implants therapy. When facing a single implant, MIAMBE could be a simple and safe option to complement the repertoire of options facing the need to lift the sinus floor.

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