Osteotome-Mediated Sinus Floor Elevation Using Only Platelet-Rich Fibrin: An Early Report on 110 Patients

Michael Toffler, DDS,* Nicholas Toscano, DDS, MS,* and Dan Holtzclaw, DDS, MS†

The bone-added osteotome sinus floor elevation (BAOSFE) technique1 and its reported modifications2–5 represent substantially less invasive and less costly alternatives for predictable implant installation in the moderately deficient posterior maxilla. Introduced by Summers1 in 1994, the BAOSFE procedure uses tapered concave-tipped osteotomes and graft materials to facilitate sinus floor elevation (SFE) with concurrent implant placement. Osteotomes are used to apically displace the graft materials, fracturing the sinus floor and elevating the Schneiderian membrane. After this “bone-cushioned” SFE and addition of more of the graft mixture, an implant, referred to as “the final osteotome,” is inserted resulting in a tented grafting area with elevation of the sinus floor for several millimeters.1 Many reports have applied modifications to Summers’ original BAOSFE protocol to expedite the procedure, minimize malleting force, and simplify sinus floor infracture.2–4 Other authors have suggested modifications to the BAOSFE procedure in terms of instrumentation,6–10 grafting materials,11–14 and implant surface and design.4,15,16

Purpose: This article describes a technique and reports on the early healing for localized sinus augmentation using a crestal approach in combination with an autologous leukocyte- and platelet-rich fibrin (PRF) concentrate.

Materials: From November 2008 to January 2010, 138 implants were placed in 110 patients using osteotome-mediated sinus floor elevation (OMSFE) with PRF.

Results: The mean residual subantral bone height of the alveolar ridge was 6.6 mm (range, 4–8 mm). The mean increase in the height of implant sites by OMSFE/PRF was 3.4 mm (range, 2.5–5 mm). A variety of 8- to 11.5-mm long (mean length, 10.1 mm) and 3.5- to 6-mm wide (mean width, 4.4 mm) screw-type implants were used. Of the 138 implants that had been placed, 97 have been restored and in function for an average loading time of 5.2 months (range, 1–11 months). The mean healing time for the loaded implants was 4 months until abutment insertion (range, 3–5 months). Three implants failed before loading for an early survival rate of both loaded and unloaded implants of 97.8%.

Conclusions: Early review of the OMSFE/PRF technique presented for localized sinus floor elevation and implant placement demonstrates a high degree of safety and success at sites with 5- to 8-mm residual subantral bone height. (Implant Dent 2010;19: 447–456)

Key Words: growth factors, residual subantral bone height, infracture
OMSFE Using Only PRF

Materials and Methods

Between November 2008 and January 2010, in 110 patients, 138 sites were treated; of these, 70 (92 sites) were women and 40 (46 sites) were men. Patient age ranged from 34 to 90 years (mean age, 58.4 years). Both partially and completely edentulous (3) patients were included. The estimated RSBH, as measured on a preoperative digital radiograph, was 4 to 8 mm. Intraoperative radiographic measurements were performed during surgery to more accurately assess the RSBH, so that the depth of sinus penetration could be estimated after implant placement. All implants penetrated at least 2 mm beyond the original level of the sinus floor.

PRF Preparation

During surgery, 18 to 54 mL (2–6 tubes) of whole blood was drawn into 9-mL glass-coated plastic tubes without anticoagulant and immediately centrifuged (PRF Process, Nice, France) at 2700 rpm for 12 minutes. Within a few minutes, the absence of anticoagulant induced the activation of platelets contained in the sample, thus triggering a coagulation cascade. The result was a fibrin clot located in the middle of a mass of acellular plasma, with a maximum number of platelets and more than half of the leukocytes caught in the mesh of fibrin. The clot was removed from the tube with a forceps (Fig. 1), and the attached red blood cells were shaved off and discarded. The clots were then placed on a grid in the PRF box (PRF Process) and compressed by a cover (masher) to create a fibrin membrane (Fig. 2). Alternatively, the clots were also placed in cylinders contained in the box and compressed by pistons to create a fibrin plug (Fig. 3). PRF plugs are preferred over the membranes because they are simpler to insert, compress, and apically displace in the prepared osteotomy.

Implant Selection

The distribution of the 138 screw-type implants was as follows:

- sixty-four Neoss ProActive implants, 3.5 to 5.5 mm in diameter and 9 to 11 mm in length (Neoss, Woodland Hills, CA),
- forty Straumann SLA and SLActive implants, 3.3 to 4.8 mm in diameter and 8 to 10 mm in length (Straumann, Andover, MA),
- twenty-three Biomet 3i Osseotite NT-tapered screws, 4 to 6 mm in diameter and 8.5 to 11.5 mm in length (Biomet 3i, Palm Beach Gardens, FL),
- three Keystone XP-1 implants, 4.8 mm in diameter and 10 mm in length (Keystone Dental, Burlington, MA),
- three Astra Osseospeed implants, 4 mm in diameter and 11 mm in length (Astra Tech, Lexington, MA),
- five Nobel BioCare Tapered Groovy implants, 5 to 6 mm in diameter and 10 mm in length (Nobel BioCare, Yorba Linda, CA).

OMSFE/PRF Surgical Technique

All patients were premedicated with 2.0 g of amoxicillin or 500 mg of azithromycin 1 hour before surgery.
Just before anesthesia, the patient rinsed with 0.12% chlorhexidine gluconate for 1 minute, and the surgical site was cleaned thoroughly with the same solution or Betadine on a cotton swab.

Full-thickness flaps were elevated after a midcrestal incision. Flap reflection was usually minimized but had to provide for adequate access and visualization to the entire ridge crest.

The authors used personally designed rapid-expansion-limited-bone (RELB) osteotomes (H&H Co., Ontario, CA) for localized SFE and simultaneous implant placement in areas of limited bone height (4.0–8.0 mm). The RELB osteotomes are marked at 4, 5, 6, 8, and 10 mm, and are 2.0 to 5.5 mm in diameter, and have either a 0.5-mm tapered tip or are parallel-sided (Fig. 4). The osteotomes of choice must be available in straight or offset design because access to first and second molar sites is very often limited with straight osteotomes and can result in less than ideal axial inclination of the implant and trauma to the lower lip. Osteotomes with a 30-degree offset are preferred as they provide adequate access without sacrificing tactile sensitivity or instrument stability. A surgical mallet (H&H Co.) was used to advance the osteotomes.

The osteotome technique favored by the authors most closely resembles a modification of Summers’ BAOSFE technique, termed localized sinus lift, first reported by Cavicchia et al and further refined by Toffler. The technique was performed in 4 steps: (1) crestal bone site preparation with calibrated drills, (2) direct sinus floor fracture with an osteotome, (3) sinus membrane elevation with PRF as the grafting material, and (4) implant placement.

By using a surgical template to aid in implant positioning, an osteotomy was initiated at the future implant site with a 2.0-mm round bur. A 2.0-mm twist drill was then advanced to a depth that was 0.5 to 1 mm from the sinus floor (working depth) as measured from the preoperative radiograph. A 2.0-to 2.2-mm wide calibrated guide pin was then inserted into the osteotomy, and this ideal subantral position was confirmed radiographically before proceeding (Fig. 5). Another measurement of the RSBH was then taken by measuring the distance from the guide pin apex to the sinus floor and adding it to the known depth of the inserted pin. This measurement was recorded for each patient as the RSBH before OMSFE. If a perforation was created and detected (Fig. 6) during initial drilling (3 patients), a calibrated probe was inserted to get an accurate reading of the RSBH. Once the working depth had been established, the site was then completely prepared with the conventional sequence of drills needed for the placement of an implant of the selected diameter. As the diameter of the osteotomy was widened, the surgeon ascertained the residual bone quality. This determined the degree to which the osteotomy was to be underprepared relative to the final implant diameter (range, 0.5–1.2 mm) to improve primary implant stability. In the interest of patient comfort, the authors widened the osteotomy using drills only, remaining 0.5 to 1 mm below the floor of the sinus. The final diameter of the osteotomy was 0.5 to 1.2 mm smaller than the implant diameter. Consistently maintaining the working depth and drilling to within ≤1 mm of the sinus floor minimizes the malleting force required to displace residual bone beneath the sinus floor, thereby reducing the possibility of membrane perforation because of uncontrolled apical penetration of the osteotome. The patient’s head was stabilized while malleting the osteotomes by placing firm pressure on the forehead. A calibrated straight or offset RELB osteotome consistent with the apical diameter of the last drill used for implant site preparation was used to achieve the initial sinus floor infracture. If the osteotome was not easily advanced, a slightly narrower (≤1.0 mm) osteotome was used or additional apical preparation with drills was performed to pierce a dense spot in the bone. The moment of induced green-stick fracture of the sinus floor was easily recognized as the layer of cortical bone forming the floor was displaced apically carrying the membrane up with it (Fig. 7). Immediately after infracture, the implant site was tested for perforation of the sinus membrane by direct inspection and the Valsalva maneuver, which was performed by asking the patient to blow through the nose (after pinching the nostrils), while holding a mirror directly underneath the osteotomy site. Two perforations were detected after infracture using the maneuver. Once membrane integrity had been verified, 2 to 4 membranes or plugs made of PRF were added to the osteotome (Fig. 8) and compressed apically (Fig. 9) into the developing subantral space by inserting the osteotome to a depth equal to the measured RSBH. The PRF acts as a “membrane insurance” to possibly seal any undetected perforation and provides tenting of the antral membrane in advance of implant placement. Sites where a perforation was detected (5 sites), PRF was inserted in the osteotome, and an implant was placed no >2.0 to 3.0 mm into the

**Fig. 4.** RELB osteotomes (H&H Co.) have markings at 4, 5, 6, 8, and 10 mm and are 2.0 to 5.5 mm in diameter and have a straight or 0.5-mm tapered tip.

**Fig. 5.** Periapical radiograph of a 2.2-mm Neoss depth gauge confirms the ideal “working depth” of 7.0 mm before the drilled expansion of the osteotomy.

**Fig. 6.** Small 2-mm perforation detected on the mesial aspect of the osteotomy as site 14. After insertion of 2 PRF plugs, a 9-mm implant will be safely placed, measuring 2 to 3 mm longer than the RSBH.
sinus cavity. If the RSBH was ≤5 mm or the patient was using a removable prosthesis to replace the missing teeth, the implants were submerged to prevent inadvertent early loading. An immediate postoperative periapical radiograph was taken to confirm sinus floor intrusion and ideal implant positioning (Fig. 10). The extent of SFE was determined by subtracting the intraoperatively measured RSBH from the implant length.

After surgery, all patients received (1) oral antibiotics for an additional 3 to 6 days, (2) nonsteroidal analgesics for 3 to 5 days, (3) detailed instructions about oral hygiene (mouth rinses with 0.12% chlorhexidine for 2 weeks), and (4) sinus-specific instructions for the next 7 days including (a) no smoking or sipping through a straw, (b) sneezing with an open mouth, (c) no blowing of the nose, and (d) use of intranasal antihistamine medication for 72 hours. Fixed prostheses were immediately replaced and relieved in the pontic area to avoid traumatizing the surgical site. Removable prostheses were relined and replaced 2 to 3 weeks postoperatively. Sutures were removed 8 to 15 days after surgery. Implants were allowed to heal for a minimum of 3 months before second-stage surgery if required. Implant stability was tested intraoperatively with an Osstell (Osstell AB, Gothenberg, SW) device, and a new periapical radiograph was taken to evaluate the new position of the sinus floor relative to the implant apex (Fig. 11).

Healing abutments were placed if second-stage surgery was required, and the implants were restored 2 to 3 weeks later. Implant survival criteria were as follows: (1) absence of clinically detectable implant mobility; (2) absence of pain or any subjective sensation; (3) absence of recurrent peri-implant infection; and (4) absence of continuous radiolucency around the implant.

**RESULTS**

Between November 2008 and January 2010, 138 OMSFE/PRF procedures were performed in 110 patients. These procedures were accomplished at 8 second molar sites, 62 first molar sites, 54 second bicuspid sites, and 14 first bicuspid sites. The mean RSBH of the alveolar crest was 6.6 mm (range, 4–8 mm). The mean increase in the height of implant sites by OMSFE was 3.4 mm (range, 2.5–5 mm). A variety of implant lengths were used, including 8.0 to 8.5 mm (n = 7), 9 mm (n = 22), 10 mm (n = 59), and 11.0 to 11.5 mm (n = 48). At the time of statistical analysis, of the 138 implants that had been placed, 97 had been restored and in function for an average loading time of 5.2 months (range, 1–11 months). The mean healing time for the loaded implants was 4 months until abutment insertion (range, 3–5 months). Five sinus membrane perforations were detected for a detectable perforation rate of 3.6%. Three occurred during the initial drilling and measured 2 mm in diameter, and two were discovered immediately after sinus floor infracture. Three implants were lost, all before loading. Two implants failed 4 weeks postoperatively because of infection. One of the implants was placed at the time of extraction, and the other was placed 8 weeks after extraction. At both sites, 3 to 4 mm of localized SFE and crestal bone augmentation were performed. At the immediate site, a perforation was detected at the time of sinus floor infracture. At the delayed site, the RSBH measured 4 mm. Both implants were replaced 4 months later without complication using OMSFE and PRF. The third implant failure occurred in a totally edentulous maxilla at uncovering because of rotational instability. This implant was placed in 4 mm of RSBH, and the patient wore her maxillary full denture throughout the healing process of 5 months. It seems that the presence of minimal RSBH, uncontrolled denture related forces, and sinus perforation increased the risk for failure because of reduced primary stability, occlusal trauma, and localized inflammatory or an altered healing response at a perforated sites. After surgery, 3 patients experienced nasal congestion and headache that abated within a few days with the use of nasal decongestants and prolonged antibiotics. One of these patients did experience a perforation during the procedure. At up to 11 months of loading, all restored implants were clinically stable. When the restored and unrestored implants are combined, the early survival rate is 97.8%.

**DISCUSSION**

A variety of SFE procedures have been proven to be successful in augmenting the subantral bone volume in the atrophic posterior maxilla. However, many of these techniques are costly and invasive and require extensive treatment time. This was the rationale for Summers’ development of OMSFE procedures. Early reports on OMSFE incorporated particulate graft materials to aid in sinus floor infracture and tenting of the sinus membrane around the implant apex. When using osteotomes to apically displace these potentially sharp-edged graft materials and bone chips, perforation of the sinus membrane may occur, but the real disadvantage is that if the internal SFE is performed this way, there is no opportunity to detect perforations unless they are very large. Displacement of graft
material through the sinus membrane is a great concern, as it can lead to transient or chronic sinusitis in 10% to 20% of sinus elevation cases, prompting the need for additional treatment.48–51 Postoperative sinus infection, even if treated early with antibiotics and saline rinsing, can potentially destroy the graft material and jeopardize implant success. In addition, if repeated hard malleting of a column of graft material does not result in sinus infracture, the graft plug must be removed, additional apical preparation performed, and the grafting procedure repeated. Cavicchia et al.52 and Toffler53 found that the bone-cushioned approach was impractical unless the subantral bone was extremely soft and a definite sinus floor was not present, a feature that, in their experience, was not frequently found. These clinical concerns and the reported success of OMSFE without particulate grafts12–14,22,23,26–28 have prompted many clinicians to exclude graft materials when performing OMSFE. For the less-experienced clinician, direct infracture without bone cushioning may increase the risk of membrane perforation; but as one becomes more familiar with the tactile and auditory changes associated with sinus floor encroachment, modification of the applied malleting force results in a more controlled, less traumatic infracture.3

Most authors report an average bone height gain of 3 to 4 mm using traditional osteotome procedures,15,19,22 and this report confirms their findings (Figs. 12 and 13). Greater degrees of elevation are attainable, but it will certainly increase the incidence and size of membrane perforation.10,24 Fortunately, membrane perforations seem to have no long-term effect on implant survival, but it is more likely that a patient would experience postoperative complications at perforated sites. It is the authors’ opinion and standard operating protocol that at perforated sites, no particulate materials should ever be placed, solely 2 plugs of PRF, which are inserted and apically displaced to the working depth. The selected implant length should not be >2 to 3 mm than that of the original RSBH. If this does not allow for the placement of an implant at least 8 to 9 mm in length, the site is abandoned, and implant placement is delayed for 3 months. This perforation protocol would seem justified in light of the fact that in the majority of cases, small rifts of the Schneiderian membrane will not disturb the healing process,12 and protrusion of an implant 2 to 3 mm into the sinus without grafting material does not adversely affect apical bone formation or implant success.13,22,54

A previous report has noted a decreased survival rate (23%) on implants placed in <5 mm of RSBH.3 In this study, 2 of 6 sites that had 4 mm of RSBH failed; 1 at 4 weeks and the other at uncovering because of rotational instability. On the basis of more recent clinical experience, the authors will place and submerge implants at sites with 4 mm of RSBH using OMSFE/PRF only if they achieve excellent primary stability with an implant stability quotient of 65 or more and they are to be part of a multiple implant-splinted restoration.55 It is felt that these surgical and restorative restrictions and the incorporation of PRF and its slow release of growth factors would provide equivocal success to those sites with ≥5-mm RSBH. The early results of this study are in accordance with many published reports documenting both the predictability and the reliability of OMSFE procedures.12–14,22,23

**CONCLUSIONS**

PRF may be used in lieu of particulate grafting to predictably elevate the sinus floor using a crestal approach. The authors use PRF whenever possible in OMSFE procedures based on its reported efficacy in membrane repair14,35 and its ability to reduce sinus graft healing time.29 The PRF membrane, or plug, also provides protection for the sinus membrane during the use of an osteotome, and in case of perforation, the fibrin matrix can aid in wound closure.14

OMSFE procedures will continue to gain popularity in an economic environment that favors less-invasive and more affordable implant-supported rehabilitation of the posterior maxilla. The incorporation of shorter implants,56,57 as well as easily obtained and inexpensive patient-derived growth factors such as PRF,58 can readily compliment OMSFE so as to shorten treatment time, expand the indications, and broaden the appeal of a minimally invasive approach to treating the moderately atrophic posterior maxilla.

**Disclosure**

The author Dr. Toffler designed the rapid-expansion-limited-bone (RELB) osteotomes, which are manufactured by H&H Co., Ontario, CA. He receives 10% on their sale from the manufacturer.

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REFERENCES


5. Fugazzotto PA, De Paoli S. Sinus floor augmentation at the time of maxillary molar extraction: Success and failure rates of 137 implants in function for up to 3 years. J Periodontol. 2002;73:39-44.


ZUSAMMENFASSUNG: Zielsetzung: 110 Patienten mit reichem Fibrin: Ein früher Bericht unter Einbeziehung von thrombozytenanhebung des Sinusbodens mittels Osteotomie (OMSFE) und unter ausschließlicher Verwendung von thrombozytenanhebungsverfahren (PRF). MATERIALIEN UND METHODEN: Von November 2008 bis Januar 2010 wurden 110 Patienten insgesamt 138 Implantate durch Anhebung des Sinusbodens mittels Osteotomie (OMSFE) und unter zusätzlicher Verwendung von PRF eingepflanzt. ERGEBNISSE: Die durchschnittliche verbleibende Knochengewebshöhe im Bereich der Kieferhöhle (RSBH) des alveolären Kamms lag bei 6.6 mm (Werte zwischen 4 bis 8 mm). Das durchschnittliche Wachstum der Höhe der Implantierungsbereiche mit OMSFE/PRF lag bei 3.5 bis 6 mm (Werte zwischen 4 bis 8 mm). Die durchschnittliche Belastungszeit von 5.2 Monaten (Werte zwischen 1 bis 11 Monaten) und 3.5 bis 6 mm breiten (durchschnittliche Breite 4.4 mm) Schraubimplantaten wendeten. Von den insgesamt 138 eingepflanzten Implantaten wurden 97 wiederhergestellt und blieben über eine durchschnittliche Heilungsdauer für die belasteten Implantate lag bei 4 Monaten (Werte zwischen 3 bis 5 Monaten) vital und in Funktion. Die durchschnittliche Belastungsdauer für die belasteten Implantate lag bei 4 Monaten bis zur Einsetzung der Stützapparatur (Werte zwischen 3 bis 5 Monaten). 3 Implantate versagten bereits vor Belastung für eine frühe Überlebensrate von sowohl belasteten als auch unbelauste d als auch Unbelasteten Implantaten in Höhe von 97,8%. SCHLUSSFOLGERUNG: Eine frühe Prüfung der OMSFE/PRF Methodik für eine lokalisierte Anhebung des Sinusbodens sowie Implantatsetzung.
ANA CLARA COSTA COSTA, DENTISTA, MESTRE EM CIÊNCIA

SCHLÜSSELWÖRTER: Wachstumsfaktoren, verbleibende Knochengewebschicht im Bereich unter der Kieferhöhle, Infrastruktur

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Elevação do piso do seno a través de osteotomos (OMSFE) usando solamente fibrina rica em plaquetas: Primer informe sobre 110 pacientes

ABSTRACTO: Propósito: Este trabajo describe una técnica e informa sobre la curación inicial del aumento localizado del seno usando un método crestal en combinación con concentrado de fibrina rica en plaquetas (PRF por sus siglas en inglés) y leucocitos autólogos. Materiales y métodos: Desde noviembre de 2008 a enero de 2010, se colocaron 138 implantes en 110 pacientes usando una OMSFE con PRF. Resultados: El altura media residual del hueso subatural (RSBH) de la cresta alveolar fue 6.6 mm (variación de 4 a 8 mm). El aumento medio de la altura en los lugares de los implantes con OMSFE/PRF fue 3.4 mm (variación de 2.5 a 5 mm). Se usaron una variedad de implantes tipo tornillo de 8 a 10 mm de ancho (ancho medio de 4.4 mm). De los 138 implantes que se habían colocado, 97 fueron restaurados y en función durante un período de carga promedio de 5.2 meses (varia

PALAVRAS-CHAVE: factores de crecimiento, altura residual del hueso subnatural, fractura incompleta

AUTHORS: Michael Toffler, DDS, Nicholas Toscano, DDS, MS, Dan Holtzclaw, DDS, MS

Elevation of the Pterygomaxillary Floor using Platelet-Rich Fibrin (OMSFE) without Grafting: Initial Report on 110 Patients

ABSTRACT: Purpose: This study describes a technique and reports on the initial healing after the elevation of the maxillary sinus floor using platelet-rich fibrin (PRF). Materials and methods: From November 2008 to January 2010, 138 implants were placed in 110 patients using OMSFE. Results: The mean residual height of the bone subalveolar (RSBH) of the crestal bone was 6.6 mm (range 4 - 8 mm). The mean increase in the height at the implant sites with OMSFE/PRF was 3.4 mm (range 2.5 - 5 mm). A variety of implants, 8 - 10 mm wide (average width 4.4 mm), were used. Ninety-seven of the 138 implants were restored and in function during an average healing period of 5.2 months (range 1 - 11 months). The mean healing period for the implants placed was 4 months until the elevation of the floor pterygoid. Three implants failed before the healing period for a tax of 97.8%. Conclusion: An initial evaluation of the technique OMSFE/PRF presented for the elevation localized of the surface of the cavity and implantation demonstrates an high grade of security and success in local with RSBH of 5 to 8 mm.

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Поднятие пазухи с помощью остеотомов (Osteotome-Mediated Sinus Floor Elevation, OMSFE) с использованием только белого тромбоцитов фибрины: предварительный отчет по 110 пациентам

ПЕРЫМЕ. Цель. В этой работе описывается методика и отчеты по ранним заживлением при локальном нарощении костной ткани в области дна пазухи с доступом через альвеолярный гребень в сочетании с концентратом фибрина, белого аутогенных лейкоцитов и тромбоцитов (PRF). Материалы и методы. С ноября 2008 г. по январь 2010 г. 110 пациентам было установлено 138 имплантов, для чего применялась методика ОМСЕ с использованием PRF. Результаты. Средняя субабнормальная высота остаточной кости (РСБН) альвеолярного гребня составляла 6,6 мм (при диапазоне от 4 до 8 мм). Среднее увеличение высоты на месте имплантов, установленных с применением ОМСЕ/PRF, составляло 3,4 мм (при диапазоне от 2,5 до 5 мм). Использовались различные винтовые импланты длиной от 8 до 11,5 мм (средняя длина 10,1 мм) и толщиной от 3,5 до 6 мм (средняя толщина 4,4
Rapor

Aracılığıyla Sinüs Yükseltme (OASY): 110 Hastadan Erken

Sadece Trombositten Zengin Fibrin Kullanılarak Osteotom

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Dobro/on

Slovo/rci/est/dobro/nash/izhe/nash/az/glagol/rci/uk/zhivete/est/nash/izhe

Kako/Ljudi/Yu/Tsherv/Est/Vedi/Yery/Est

slovo/uk/buki/az/nash/tverdo/rci/az/ljudi/softsign/nash/az/ya/vedi/yery/slovo/on/tverdo/az/kako/on/slovo/tverdo/izhe

RSBH

slovo/on/slovo/tverdo/az/vedi/ljudi/ya/est/tverdo/on/tverdo

uk/rci/on/vedi/est/nash/softsign/buki/est/zemlja/on/pokoj/az/slovo/nash/on/slovo/tverdo/izhe/izhe/eoborotnoye/fert/fert/est/kako/tverdo/izhe/vedi/nash/on/slovo/tverdo/izhe/vedi/myslite/est/slovo/tverdo/az/kher

Pokoj/rci/est/dobro/vedi/az/rci/izhe/tverdo/est/ljudi/softsign/nash/yery/izhebreve/az/nash/az/ljudi/izhe/zemlja/myslite/est/tverdo/on/dobro/izhe/kako/izhe

JAPANESE / 日本語

多血漿板フィブリンのみを用いたオステオトーム法上顎洞底上術（OMSFE）：110名の患者に関する初期レポート

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研究概要:
目的: 当文献は自己由来白血球と多血漿板フィブリン（PRF）凝縮を混合して用いた歯槽頂貫通型局部的上顎洞底上術のテクニックを説明し、さらに初期治療について報告する。

素材と方法: 2008年11月から2010年1月までの期間に、110名の患者にPRFを用いOMSFEを施術し138本のインプラントを埋入した。

結果: 歯茎に残る平均上顎洞下骨の高さ（RSBH）は6.6 mm（範囲4から8 mm）で、OMSFE/PRF施術後インプラント部位の高さにおける平均増加量は3.4 mm（範囲2.5から5 mm）であった。8から11.5mmの長さ（平均10.1mm）そして3.5から6mmの幅（平均4.4mm）の多種スクリュータイプインプラントを使用した。埋入した138本のインプラントのうち、97本は平均荷重時間5.2ヶ月（範囲1から11ヶ月）にわたり修復機能している。負荷インプラントの平均治癒時間はアパレント挿入まで4ヶ月（範囲3から5ヶ月）である。負荷前に3本のインプラントが失敗に終わり、荷重ならびに非荷重インプラントの初期生存率は97.8%となった。

結論: 局部的上顎洞底上術とインプラント埋入を目的としたOMSFE/PRFテクニックの初期評価では、高度の安全性と5から8mmRSBH部位での成功が明らかになった。

キーワード: 増殖因子、残存上顎洞下における骨の高さ、infracture

ÖZET: Amacı: Bu çalışma, bir kret yaklaşımlı birlikte otolog lökosit ve trombositten zengin fibrin (TZF) konsantresi kullanılarak yapılan lokalize sinüs ogmentasyonu tekniğini tanımlamakta ve erken evrede iyileşmeyi anlamlamaktadır. Gereç ve Yöntem: Kasım 2008’den ocak 2010’a kadar 110 olguda TZF ile birlikte OASY kullanılarak 138 implant yerleştirildi. Bulgular: Alveoler surün ortalama rezidüel subantral kemik yüksekliğini 6.6 mm (4 ile 8 mm arasında) idi. OASY/TZF ile implant yerlerinde ortalama yükseklik artışı 3.4 mm (2.5 ile 5 mm arasında) olarak bulundu. 8 ile 11.5 mm uzunluğunda (ortalama uzunluğu 10.1 mm olan) ve 3.5 ile 6 mm genişliğinde (ortalama genişliği 4.4 mm olan) vida türünden çeşitli implantlar kullanılıdı. Yerleştirilen 138 implantta 97’sine restorasyon uygulandi ve ortalama olarak 5.2 aylık yükleme süresinde fonksiyon sağladi (1 ile 11 ay arasında). Yüklenen implantların abutman yerleştiremiyordu. Diğer ortalama iyileşme süresi 4 ay idi (3 ile 5 ay arasında). Yükleme yapılmadan önce 3 implant başarısızlığı uğradı ve böylece, yüklenmiş ve yüklenmiş implantların erken sağkalım oranı %97.8 olarak bulundu. Sonuçlar: Lokalize sinüs yükseltme ve implant yerleştirme için sunulan bu OASY/TZF tekniğinin erken evrede değerlendirilmesi, bu tekniğin 5 ile 8 mm arasında rezidüel subantral kemik yüksekliği ile birlikte yüksek düzeyde güvenilirir ve başarı sağladığı işaret etmektedir.
ANAHTAR KELİMELER: büyüme faktörleri, rezidüel subantral kemik yüksekliği, infrak turf.
僅使用富血小板纖維蛋白的骨髓上髄式脊椎增高術 (OMSFE)：110 名患者的早期報告。

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摘要:
目的：報告描述使用脊椎方法結合自體富血球和富血小板纖維蛋白 (PRF) 膠體進行局部脊椎增高術的早期療效之技術和報告。

資料與方法：從 2008 年 11 月至 2010 年 1 月，使用 OMSFE 加 PRF 為 110 名患者植入 138 顆植體。

結果：通過脊椎脊椎的平均殘餘脊椎高度 (RSBH) 高 6.6 mm (範圍從 4 到 8 mm)。使用 OMSFE/PRF 時，植體部位高度平均增加 3.4 mm (範圍從 2.5 到 5 mm)。使用長 8 至 11.5 mm (平均長度 10.1 mm) 和寬 6 mm (平均寬度 4.4 mm) 的各種螺紋型植體。在種植的 138 顆植體中，有 97 顆已經修復並使用，平均載入時間為 5.2 個月 (範圍從 1 到 11 個月)。載入植體的平均療效時間為 4 個月 (範圍從 3 到 5 個月)，之後才裝入支柱牙。載入前有 3 項植體失敗，載入與未載入植體兩者的早期存活率都是 97.8%。

結論：局部脊椎增高術和植體置入的 OMSFE/PRF 技術的早期檢討顯示，RSBH 達 5 至 8 mm 的部位具有高度安全和成功率。

關鍵字：成長因子、殘餘脊椎高度、不完全骨折

KOREAN / 한국어

혈장 풍부 섬유소만을 이용한 골절단술 매개 상악동 거상술 (OMSFE): 환자 110명에 대한 조기 보고

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요약:
목적: 본 연구는 자가 백혈구 및 농축 혈장풍부 섬유소 (PRF)를 이용한 농축 부위 접근법으로 국소 상악동 거상술 시행 시 조기 치유를 위한 기법을 설명하고, 이를 보고한 것이다.

제료 및 방법: 2008년 11월부터 2010년 1월까지 PRF를 이용한 OMSFE로 138개의 임플란트를 110명의 환자들에게 식립하였다.

결과: 치료중의 상악동 하부 잡존 골 높이(RSBH)의 평균은 6.6mm 였다 (범위: 4-8mm). OMSFE/PRF에 의한 임플란트 높이의 증가 평균은 3.4 mm였다 (범위: 2.5-5mm). 높이 8 ~ 11.5mm (평균 높이: 10.1mm), 그리고 높이 3.5 ~ 6mm (평균 높이: 4.4mm)의 다양한 스크류 타입 임플란트가 이용되었다. 식립된 138개의 임플란트들 중 97개가 수복되었고, 평균 식립 시간은 5.2개월이었다 (범위: 1 ~ 11개월). 식립된 임플란트의 평균 처유시간은 지대치 석리 시까지 4개월이었다 (범위: 3 ~ 5개월). 식립 및 미식립 임플란트의 조기 생존률은 97.8%였고, 3개의 임플란트는 생존에 실패하였다.

결론: 국소 상악동 거상술을 위해 OMSFE/PRF 기법의 초기 검토 사항을 제시하였다. 5 ~ 8 mm RSBH에서의 임플란트 식립은 매우 안전하며 성공적인 것으로 입증되었다.

키워드: 성장 인자, 잡존 상악동 하부 골 높이, infracture