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I. G. Rytchenko *https://orcid.org/0009-0006-4980-5039*
V. V. Kaminskyy ***https://orcid.org/0000-0002-2693-9003***
O. P. Viesova ***https://orcid.org/0000-0002-7018-0487***

COMBINED APPROACH USING A CAS KIT, DENSAH BURS, A-PRF, AND SIMULTANEOUS IMPLANT PLACEMENT IN POSTERIOR MAXILLARY ALVEOLAR RIDGE RESORPTION (CASE REPORT)

Shupyk National Healthcare University of Ukraine, Kyiv, Ukraine

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Purpose is to describe the clinical outcome of a combined approach using a CAS kit, DENSAH burs, A-PRF, and simultaneous implant placement in severe posterior maxillary alveolar ridge resorption. **Methods.** This case report involved a patient with a residual bone height of approximately 2 mm. Hydraulic transcrestal sinus floor elevation, osteodensification, A-PRF application, and simultaneous implant placement were performed. Primary and secondary implant stability (ISQ) and the radiographic peri-implant bone condition at 18 months were assessed. **Results.** Primary stability was ISQ 63 and increased to ISQ 76 at 6 months. A-PRF may have contributed to a favourable reparative course. At 18 months, the implant remained clinically stable; qualitative CBCT assessment showed no signs of clinically significant peri-implant bone loss, although marginal bone loss was not measured quantitatively. **Conclusions.** In this case, the combined approach resulted in stable implant function despite critically low residual bone height. The finding should be confirmed in larger studies.

Keywords: sinus lift, CAS kit, DENSAH, A-PRF, implant stability.

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І. Г. Ритченко, В. В. Камінський, О. П. Вєсова

КОМБІНОВАНИЙ ПІДХІД ІЗ ЗАСТОСУВАННЯМ НАБОРУ CAS, ФРЕЗ DENSAH, A-PRF ТА ОДНОЧАСНОГО ВСТАНОВЛЕННЯ ІМПЛАНТАТУ ПРИ РЕЗОРБЦІЇ АЛЬВЕОЛЯРНОГО ГРЕБЕНЯ ВЕРХНЬОЇ ЩЕЛЕПИ (КЛІНІЧНИЙ ВИПАДОК)

Національний університет охорони здоров'я України імені П. Л. Шупика, Київ, Україна

Мета дослідження – описати клінічний результат комбінованого підходу із застосуванням набору CAS, фрез DENSAH, A-PRF та одночасного встановлення імплантату у разі вираженої резорбції альвеолярного гребеня дистального відділу верхньої щелепи. **Методи.** Представлено клінічний випадок пацієнта із залишковою висотою кістки близько 2 мм. Виконано гідравлічний трансальвеолярний синус-ліфтинг, остеоденсифікацію, застосовано A-PRF та одночасно встановлено імплантат. Оцінювали первинну й вторинну стабільність імплантату (ISQ) та рентгенологічний стан періімплантатної кістки через 18 місяців. **Результати.** Первинна стабільність становила ISQ 63, а через 6 місяців – ISQ 76. Застосування A-PRF могло сприяти сприятливому перебігу репаративних процесів. Через 18 місяців імплантат залишався клінічно стабільним; за якісною оцінкою КПКТ не виявлено ознак клінічно значущої періімплантатної втрати кістки, однак кількісне вимірювання маргінальної втрати кістки не проводили. **Висновки.** У цьому клінічному випадку комбінований підхід забезпечив стабільне функціонування імплантату за критично малої залишкової висоти кістки. Отриманий результат потребує підтвердження у дослідженнях із більшою вибіркою.

Ключові слова: синус-ліфтинг, CAS-набір, DENSAH, A-PRF, стабільність імплантату.

Introduction

Morphological features of the alveolar bone are of key importance for predicting the success of dental implantation, as they determine the choice of bone augmentation technique, implant stability and long-term effectiveness of prosthetic structures [1; 2]. One of the most difficult anatomical areas for implantation is the distal maxilla, where, after tooth loss, there is a pronounced resorption of the alveolar ridge due to bone remodeling and maxillary sinus pneumatization [2; 3]. This creates significant difficulties for implantation and requires the use of additional surgical techniques.

Sinus floor elevation is a common method for increasing bone volume in the posterior maxilla and is associated with high implant survival rates [3–5]. The conventional lateral-window approach described by Tatum [6] is predictable but

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carries a risk of Schneiderian membrane perforation and other complications [7; 8]. A less invasive alternative is transalveolar (transcrestal) sinus floor elevation, in which the sinus floor is elevated through the alveolar crest. Its predictability depends substantially on residual bone height. Modern instruments may improve procedural control: the CAS kit provides hydraulic membrane elevation, whereas DENSAH burs compact bone by osteodensification [10–14]. A-PRF is used as an adjunctive biologic material that may support angiogenesis and reparative processes [15; 16].

In the present case, simultaneous implant placement at a residual bone height of approximately 2 mm was technically possible because controlled hydraulic membrane elevation and osteodensification allowed primary stability to be achieved. A-PRF may have contributed to a favourable healing course; however, its causal effect cannot be established from a single case without a control group. Further studies are required to evaluate the long-term outcomes of this combined approach in patients with severe bone deficiency.

The aim of this report was to describe the clinical outcome of a combined approach comprising hydraulic transcrestal sinus floor elevation with a CAS kit, osteodensification with DENSAH burs, A-PRF application, and simultaneous implant placement in severe posterior maxillary alveolar ridge resorption, and to assess primary and secondary implant stability and the radiographic peri-implant bone condition during 18 months of follow-up.

Materials and Methods

This work is a case report with an 18-month follow-up. The combined approach included hydraulic transcrestal sinus floor elevation using a CAS kit, osteodensification with DENSAH burs, A-PRF application, and simultaneous implant placement in a site with severe posterior maxillary alveolar ridge resorption.

The 61-year-old patient had a residual alveolar ridge height of less than 3 mm, no active inflammatory disease of the maxillary sinus, and no general contraindications to implant surgery. Uncontrolled systemic disease, active chronic sinusitis, other relevant maxillary sinus pathology, and allergy or intolerance to the materials used were considered contraindications to the selected approach.

Preoperative diagnostics included cone-beam computed tomography (CBCT) to assess bone conditions and the anatomy of the surgical site. A Crestal Approach Sinus (CAS) kit (Osstem Implant) was used for controlled hydraulic elevation of the Schneiderian membrane [5; 17]. The system includes depth-controlled burs with an inverse-conical working tip for atraumatic access to the sinus floor. The membrane was elevated with sterile 0.9 % NaCl delivered through a sealed hydraulic lifter.

The implant osteotomy was prepared with DENSAH burs (Versah), which compact bone by osteodensification rather than removing it [12]. A tapered Dentis OneQ-SL implant, 5.2 mm in diameter and 7 mm in length, was placed simultaneously. Primary stability was assessed by resonance frequency analysis and expressed as the Implant Stability Quotient (ISQ).

As an adjunct to support reparative processes, platelet-rich fibrin (A-PRF) was prepared by centrifuging the patient's venous blood at 1300 rpm for 14 minutes without anticoagulants. The resulting membranes and fibrin clots were placed in the implant and sinus-elevation sites [18; 19].

The following outcomes were assessed: (1) primary implant stability by ISQ; (2) secondary stability at 6 months; and (3) clinical implant stability and the qualitative radiographic peri-implant bone condition on CBCT at 18 months. Marginal bone loss was not measured quantitatively.

Since the study is a description of a clinical case, no formal statistical analysis was performed. Statistical hypotheses were not evaluated due to the lack of a sample.

The case report was prepared in accordance with the ethical principles of the World Medical Association Declaration of Helsinki (2024 revision). The patient provided written informed consent for the surgical intervention and for publication of the clinical and radiographic data. Publication of the case was approved by the Bioethics Committee of Shupyk National Healthcare University of Ukraine (Protocol No. 12/19, dated 5 December 2024).

Research results and their discussion

The patient complained of missing teeth in the area of the upper left premolar and molar, which complicated the chewing function. The patient had a history of chronic periodontitis, which led to tooth loss. To assess the state of bone tissue and anatomical features of the surgical site, cone beam computed tomography (CBCT) was performed. The study revealed significant resorption of the alveolar ridge and a residual bone height of about 2 mm, which made traditional implantation difficult (Fig. 1).

The procedure was performed under local anesthesia. Hydraulic transcrestal sinus floor elevation was carried out with the CAS kit, allowing controlled elevation of the Schneiderian membrane. Sterile saline was delivered through a sealed hydraulic lifter to elevate the membrane evenly and reduce the risk of mechanical perforation [10].

After membrane elevation, the implant osteotomy was prepared with DENSAH burs in reverse (counterclockwise) rotation. Osteodensification compacted bone around the osteotomy and provided a small additional elevation of the sinus floor without placement of a bone graft. A tapered implant with an aggressive thread design was placed simultaneously. Despite a residual bone height of approximately 2 mm, primary stability of ISQ 63 was achieved, and no intraoperative complications were recorded (Fig. 2).

At 6 months, secondary stability was ISQ 76, and no clinical complications were identified. At the final surgical stage, A-PRF prepared at 1300 rpm for 14 minutes without anticoagulants was placed in the implant and sinus-elevation sites. According to the literature, this fibrin matrix may provide gradual release of biologically active factors and support reparative processes [18; 19]; in this case, its contribution cannot be separated from the effects of the other treatment components. Postoperative panoramic radiography and control imaging confirmed elevation of

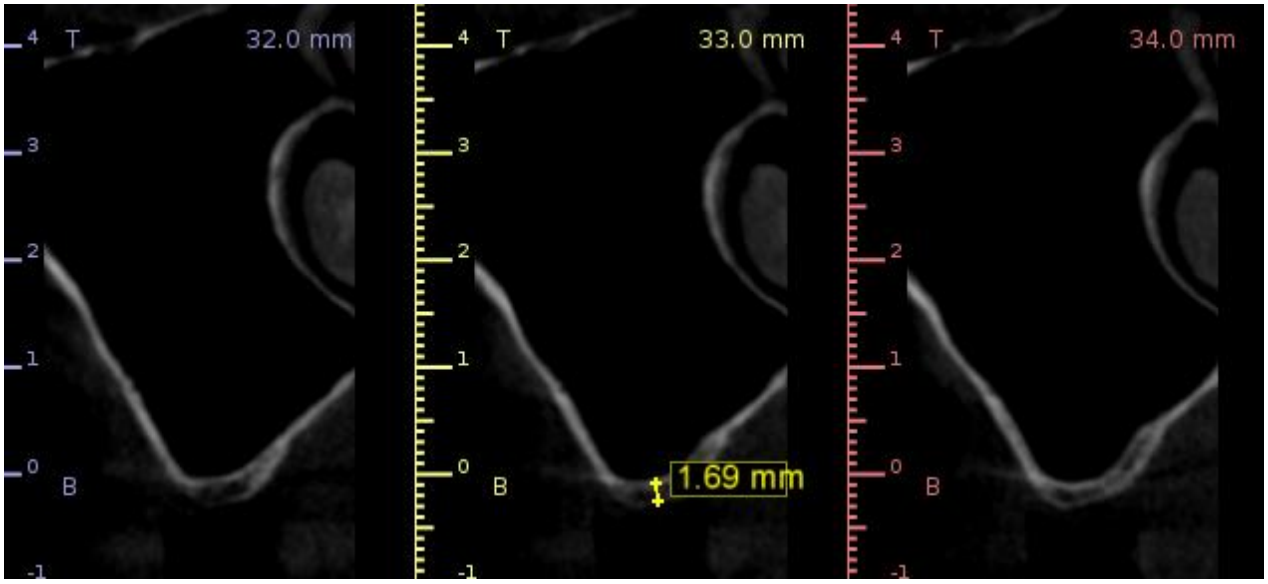


Fig. 1. Cone-beam computed tomography (CBCT) before surgery (initial bone condition)

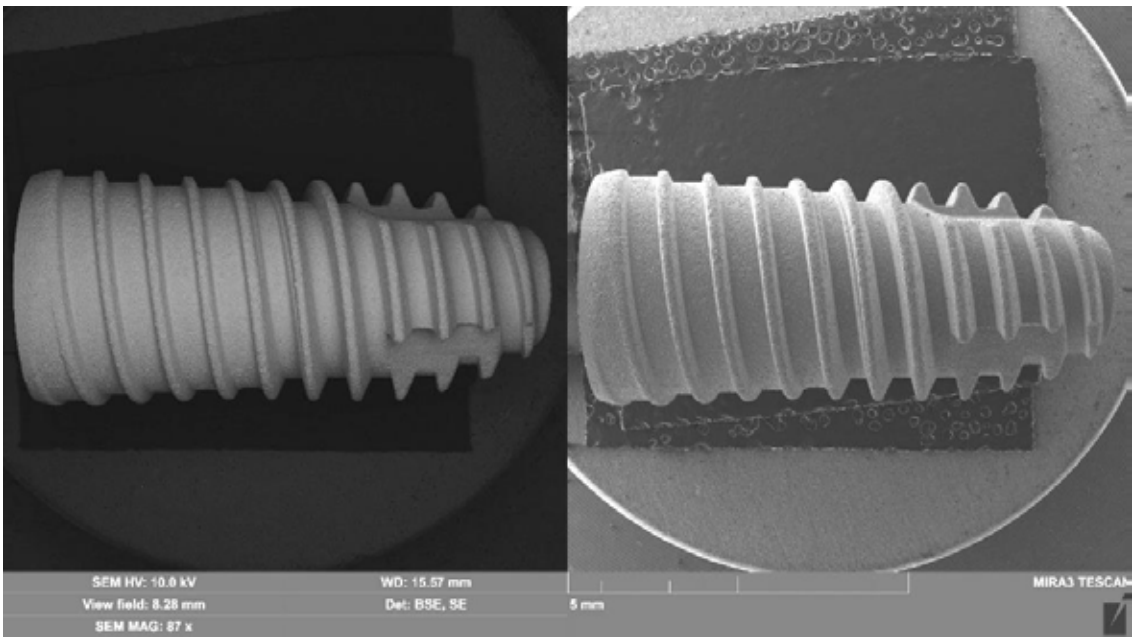


Fig. 2. Macro design of the installed implant (shows the features of the implant that contribute to its stability)

the Schneiderian membrane, appropriate three-dimensional implant position, and no early complications (Fig. 3). At 18 months, CBCT showed a preserved peri-implant bone level on qualitative assessment, without a continuous peri-implant radiolucent line or other radiographic signs of impaired osseointegration. Marginal bone loss was not measured quantitatively (Fig. 4).

The final clinical examination demonstrated successful functional and aesthetic restoration of the dentition, which was completed with the installation of a zirconium crown (Fig. 5). The crown had a natural anatomical shape, matched the color of the adjacent teeth and ensured proper occlusal contact.

The design of the crown provided natural aesthetics, matching the color and shape of the adjacent teeth, as well as optimal distribution of the chewing load. The patient noted the absence of discomfort and complete restoration of chewing function, which confirms the effectiveness of the applied technique and the stability of the implant in the long term.

Transalveolar (transcrestal) sinus floor elevation is less invasive than the lateral-window approach but is performed with limited direct visualization. Potential complications include Schneiderian membrane perforation, postoperative sinus complications, dizziness associated with traditional osteotome use, and implant displacement [10]. Careful case selection and controlled instrumentation are therefore essential.

Residual bone height is a key determinant of the surgical approach. Comparative and multicenter studies have most

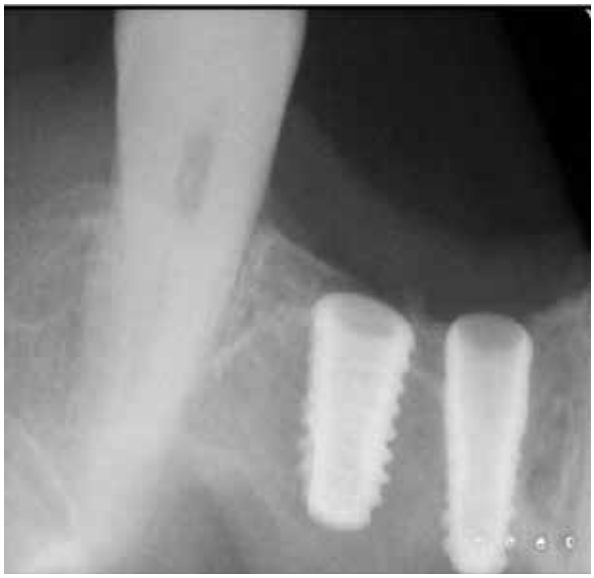


Fig. 3. X-ray image after surgery (shows the correct positioning of the implant and the raised membrane)

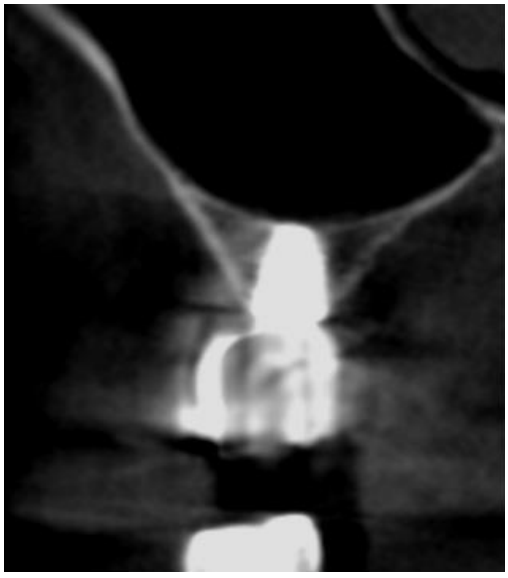


Fig. 4. Cone-beam computed tomography (CBCT) at 18 months (stable peri-implant bone level on qualitative assessment)



Fig. 5. Final restoration with a zirconia crown (illustrates the final aesthetic and functional result)

often evaluated transcrestal techniques at residual bone heights of 3–6 mm or ≤5 mm; when residual bone height is below approximately 3–4 mm, many treatment algorithms favor a lateral-window approach because primary stability and membrane control may be less predictable [3; 9; 12; 15]. Nevertheless, recent clinical studies of hydraulic or osteodensification-assisted transcrestal elevation with simultaneous implant placement have reported favourable short-term outcomes in carefully selected sites with low residual bone height [8; 11; 12; 15]. The present 2-mm case therefore lies at the lower boundary of the available evidence and should not be interpreted as a general indication for the transcrestal approach.

In this case, the transcrestal strategy was selected because the defect was localized, CBCT showed no active sinus disease, controlled hydraulic membrane elevation was available, and osteodensification was combined with a short, wide, tapered implant. An ISQ of 63 was obtained at placement. Implant macrodesign may have contributed to mechanical fixation [17]. A-PRF was used as an adjunct; because there was no control group, it can only be stated that it may have contributed to a favourable healing course [18; 19].

At 18 months, a favourable clinical and qualitative radiographic outcome was observed. However, a single case cannot establish efficacy or comparative superiority. Additional limitations include the absence of a control group, quantitative marginal bone-loss measurements, and standardized longitudinal radiographic comparison. Larger prospective studies with standardized measurements are required to confirm the safety, reproducibility, and long-term performance of this approach.

Conclusions

In this case report, hydraulic transcrestal sinus floor elevation with a CAS kit, osteodensification with

DENSAH burs, A-PRF application, and simultaneous implant placement were technically feasible at a residual bone height of approximately 2 mm. Primary stability of ISQ 63, secondary stability of ISQ 76 at 6 months, and a stable clinical and qualitative radiographic outcome at 18 months were achieved. A-PRF may have contributed to a favourable healing course, but its independent effect cannot be determined from a single case. Selection of this approach should be individualized, and the result cannot be generalized without confirmation in larger studies.

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Електронна адреса для листування irritchenko@gmail.com