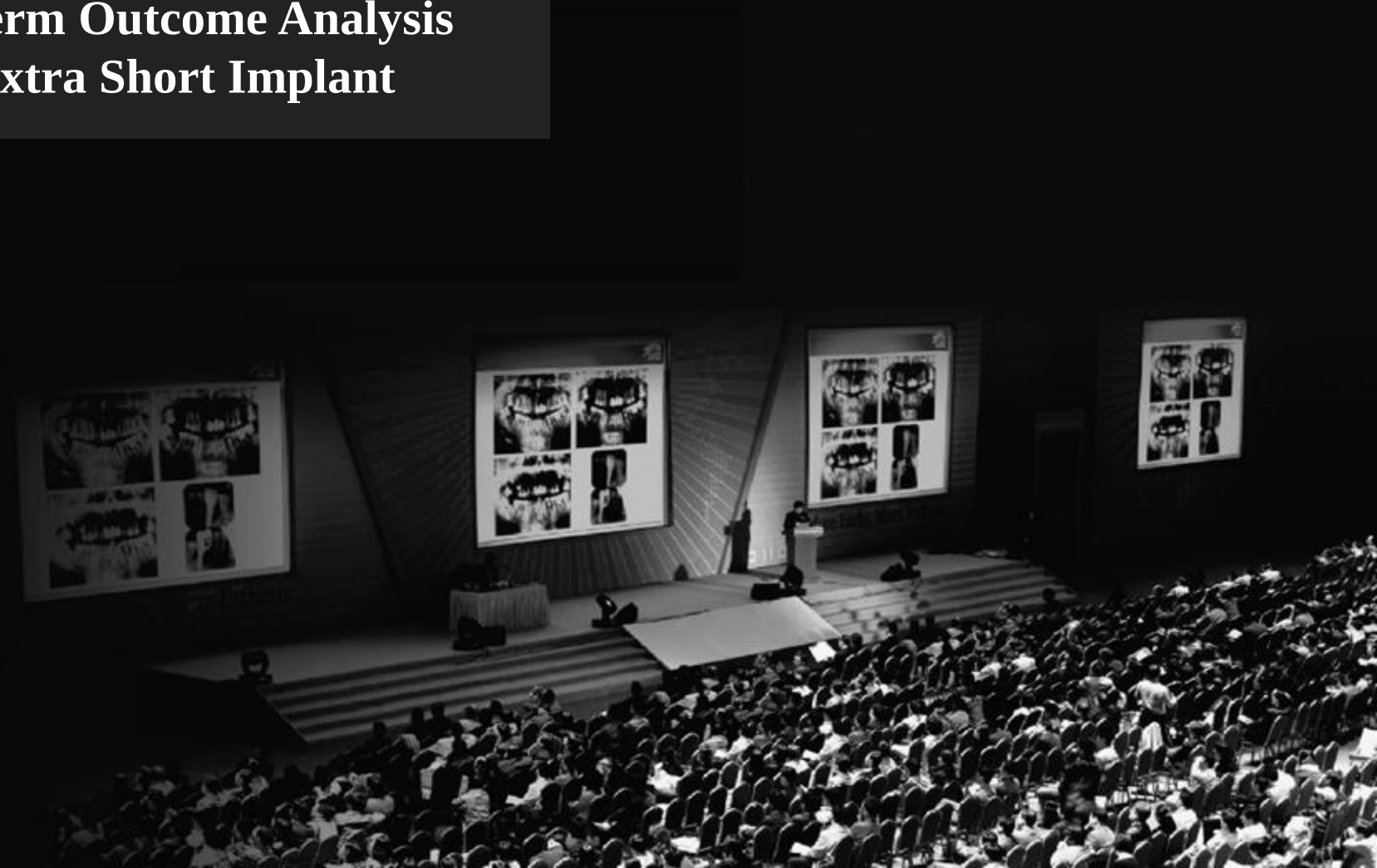
Clinical Application and Short-Term Outcome Analysis of the STERI-OSS Tissue Level Extra Short Implant



STERI-OSS IMPLANT

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DDS, MSD, Ph.D in Oral and Maxillofacial Surgery

Introduction of the Key Doctor for Steri-oss Implant

- Representative Director of Seoul Dental Clinic
- Adjunct Professor, College of Dentistry, Seoul National University
- Adjunct Professor, Sanggye Paik Hospital Seoul, Inje University
- Adjunct Professor, Nowon Eulji Hospital Seoul, Eulji University
- Chairman & Advisor of F&I Implant Research
- Director of Osstem Master Advanced Course
- Director of Dentium GBR & Sinus Course
- Director of Megagen Advanced Course
- Director of Cowellmedi BMP Course
- Director of Neobiotech Sinus Course
- Director of Purgo GBR Course

Abstract

This clinical report presents a retrospective analysis cases in which the STERI-OSS Tissue Level Extra Short Implant was placed and restored over the course of one year (2022–2023).

The STERI-OSS Tissue Level Extra Short Implant demonstrated excellent primary stability and high ISQ values, yielding clinical success comparable to that of conventional-length implants.

In addition, this paper reviews recent literature on implants shorter than 6 mm, focusing on biomechanical considerations, survival rates, and the advantages of the tissue-level design in reducing vertical lever effects.

#Steri-oss Implant #Tissue Level #Extra Short Implant #Clinical Crown Height #Screw Loosening #Vertical Lever #ISQ

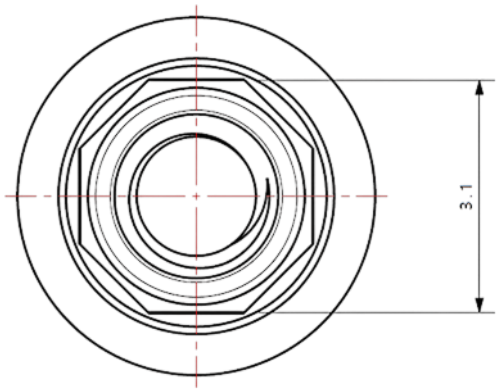
Introduction

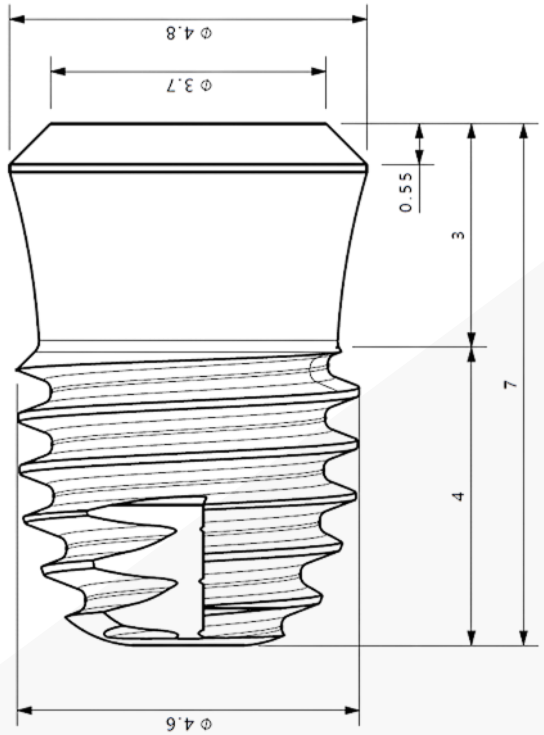
The STERI-OSS Bone Level Implant has long been recognized for its consistent stability, high ISQ values, and minimal incidence of screw loosening.

Its 11° internal connection ensures excellent compatibility with most prosthetic systems, establishing it as a reliable clinical option.

In 2022, the STERI-OSS Tissue Level Extra Short Implant was introduced to me, and approximately 50 implants were placed and restored over the following year.

Encouraged by the favorable short-term outcomes, this report was compiled together with a review of relevant literature and clinical case analyses.





Definition of Implant Dimensions

According to the 2006 European Association for Osseointegration (EAO) consensus, implants are classified as follows:

- Short implant: Intraosseous length ≤ 8 mm
- Extra-short implant: Length ≤ 6 mm
- Wide implant: Diameter ≥ 4.5 mm
- Narrow implant: Diameter < 3.5 mm

Implants with a length of ≤ 6 mm are classified as extra-short. STERI-OSS Tissue Level Extra Short Implants are actively manufactured and supplied in a range of diameters for the domestic market.

Clinical Reliability of Extra Short Implant

1. Literature Review

- Malo et al. (2015): Reported a 98.5% five-year survival rate for 6 mm implants placed in the posterior mandible.
- Pommer et al. (2018): A meta-analysis found no significant difference in marginal bone loss between extra-short and conventional-length implants.
- Tawil et al. (2017): Demonstrated that an ISQ value greater than 65 correlates with biomechanical stability, regardless of implant length.

2. Survival Rates & Bone Level Changes

- Calvo Guirado (2016): 60 implants with a length of 4 mm showed a 97.5% one-year survival rate.
- Slotte et al. (2012): Ø 4.1 × 4 mm SLActive implants demonstrated a two-year survival rate of 92.3% at a crown-to-implant (C/I) ratio of 2.5, with marginal bone loss of −0.43 mm at 12 months and −0.11 mm at 24 months.
- Atieh (2012): A meta-analysis of 2,573 short implants revealed a five-year cumulative survival rate of 98%.
- Srinivasan (2012): Confirmed the predictability of 6–7.5 mm implants as a treatment option.
- Clinical Report from a Global Leading Brand – Straumann SLActive System: Clinical reports from global leading brands have also demonstrated the stability of extra-short implants, particularly those with a 4 mm fixture length.
- Slotte et al. (2012, CIDRR) placed 87 SLActive implants measuring Ø 4.1 × 4 mm in the severely resorbed posterior mandible of 24 patients. The average crown length was 9.9 mm, with a C/I ratio of 2.5. The two-year survival rate was 92.3%, and marginal bone level changes were −0.43 mm at 12 months and −0.11 mm between 12 and 24 months, indicating stable bone maintenance.
- Calvo Guirado (2016, COIR) evaluated 60 SLActive implants with a 4 mm length placed in 10 mandibular edentulous patients, splinted to 10 mm implants in a full-arch FDP. The 12-month survival rate was 97.5%, reflecting excellent outcomes.
- These global leading brand reports support the clinical stability of 4 mm extra-short implants and demonstrate that even with reduced length, they can serve as a reliable long-term treatment option.

Clinical Reliability of Extra Short Implant

3. Biomechanical Considerations

(Note: The C/I ratio refers to the height of the prosthetic crown above the gingiva divided by the length of the implant embedded in the bone.)

- Anitua (2014): Crown height space (CHS) had a greater influence on marginal bone loss (MBL) than the C/I ratio.

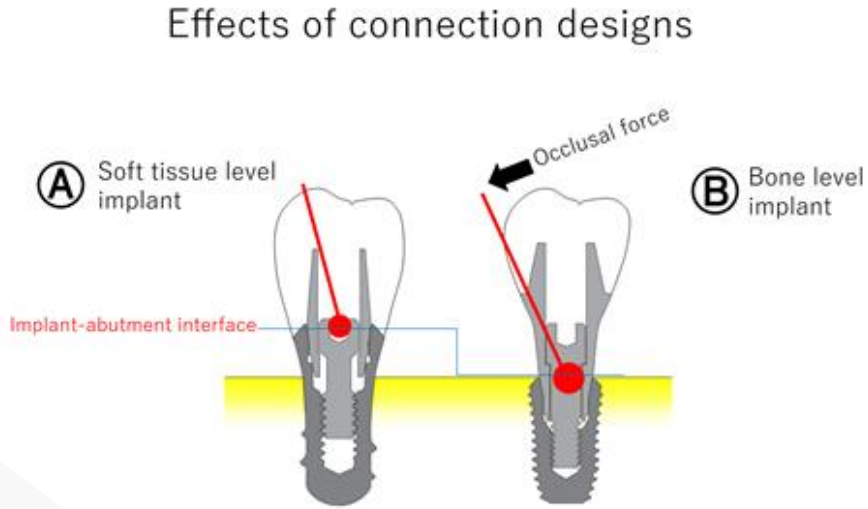
- Anitua (2015, CIDRR):
  - No significant correlation was found between the C/I ratio of short implants and MBL.
  - However, the use of cantilevers, which represents a challenging biomechanical condition, was associated with a marked increase in MBL.
    - MBL without cantilever: 0.31 mm
    - MBL with cantilever: 0.74 mm (approximately 2.4 times higher)
    - MBL at C/I < 2: 0.37 mm
    - MBL at C/I ≥ 2: 0.31 mm
  - These findings indicate that the presence of a cantilever is a more critical factor than the C/I ratio in influencing MBL changes.

- Urdaneta (2010): High C/I ratios were related to prosthetic complications but not to bone loss.
- Sun (2013): Over a six-year observation period, increased C/I ratios and crown height were linked to technical complications, but not to biological ones.
- EAO (2009): C/I ratios ≤ 2 are considered clinically acceptable and may serve as a viable alternative to more invasive vertical augmentation procedures (e.g., sinus grafting, vertical bone grafting).

Rationale for Using Tissue Level Design in Extra Short Implant

1. Vertical Cantilever Management

Tissue level implants reduce the clinical crown length by increasing cuff height, which decreases vertical cantilever forces. STERI-OSS Tissue Level Extra Short Implant has a 3 mm cuff, helping to mitigate biomechanical stress during non-axial loading.



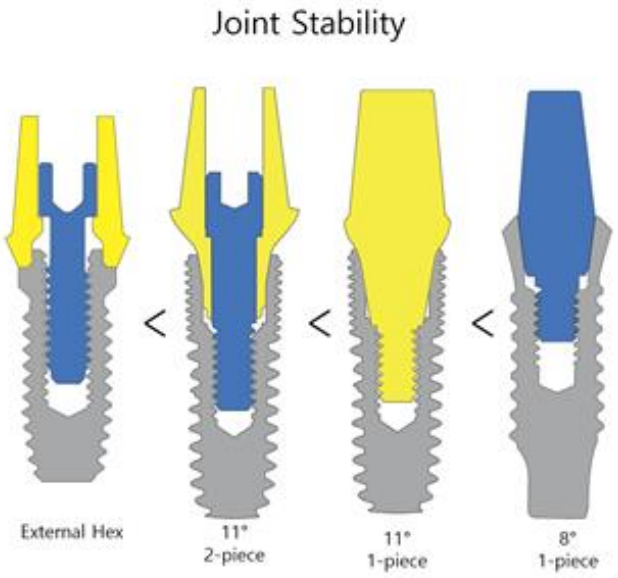
2. Prosthetic Compatibility

The second rationale for utilizing tissue-level design in extra-short implants lies in prosthetic compatibility.

Unlike bone level extra short implants, which typically require a reduction in the abutment screw length to accommodate their short body (e.g., 2 mm bevel + 4 mm thread = 6 mm total length), tissue level Implants allow for the use of conventional prosthetic components without modification. This is largely due to the relatively shorter abutment screws used in tissue level designs.

In this regard, STERI-OSS Tissue Level Extra Short Implant offers enhanced versatility. For instance, it is manufactured in dimensions as small as 3 mm in length and 5 mm in diameter dimensions that would be difficult to implement in bone level designs while maintaining mechanical integrity and prosthetic compatibility.

Rationale for Using Tissue Level Design in Extra Short Implant



3. Implant Diameter Flexibility

The third rationale for employing a tissue level design, based on clinical reasoning, is its superior joint strength compared to bone level systems.

This enhanced mechanical integrity enables the use of narrower implant diameters without compromising stability. For instance, bone-level extra-short implants with an 11° internal connection are typically only available in diameters of 5.0 mm or greater in the domestic market.

In contrast, tissue-level extra-short implants are available starting from a 4.0 mm diameter, offering greater versatility in anatomically constrained cases.

Materials and Methods

From 2022 to 2023, 50 implants of STERI-OSS Tissue Level Extra Short were placed in posterior regions. Both single and splinted restorations were included. Initial ISQ values and follow-up results indicated strong primary stability and high patient satisfaction.

Results

- No early failures observed.
- No screw loosening in single restorations.
- Excellent soft tissue adaptation.
- No radiographic evidence of marginal bone loss.

Discussion

Extra short implants were once considered unreliable; however, recent evidence and clinical experience have demonstrated their predictability in cases with limited bone height.

Emerging consensus suggests that implant success is more dependent on primary stability, CHS, and prosthetic design than on length alone.

Key advantages of the STERI-OSS Tissue Level Extra Short Implant include:

- 3 mm cuff to reduce vertical leverage
- Full compatibility with standard prosthetic components
- Mechanical stability even at Ø 4.0 mm diameter
- Versatile dimensions including 3 mm length and Ø 5.0 mm diameter

These features are particularly beneficial in single restorations and atrophic posterior regions.

Conclusion

STERI-OSS Tissue Level Extra Short Implant demonstrated stable and satisfactory short-term clinical outcomes, offering a safe and practical solution with biomechanical advantages and prosthetic compatibility.

While there is a prevailing perception that longer fixtures are inherently more stable, recent studies and the present clinical results indicate that short implants can achieve equally reliable stability.

In particular, 4 mm extra-short implants have been shown in multiple reports to deliver predictable and successful outcomes.

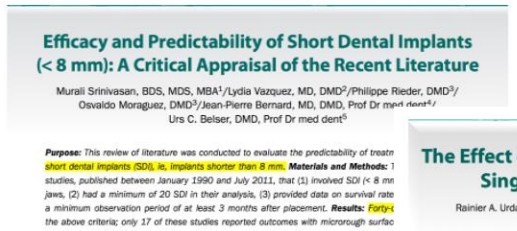
Therefore, rather than resorting to aggressive bone grafting, the use of the STERI-OSS Extra Short Implant yielded results that were satisfactory for both patients and clinicians, confirming its potential as an excellent alternative in cases with limited vertical bone height.

References

1. Calvo-Guirado, J.L., et al. (2016). Evaluation of extra-short 4-mm implants in mandibular edentulous patients. Clinical Oral Implants Research.

2. Slotte, C., et al. (2012). 4-mm implants in the severely resorbed posterior mandible: a prospective clinical study. Clinical Implant Dentistry and Related Research.

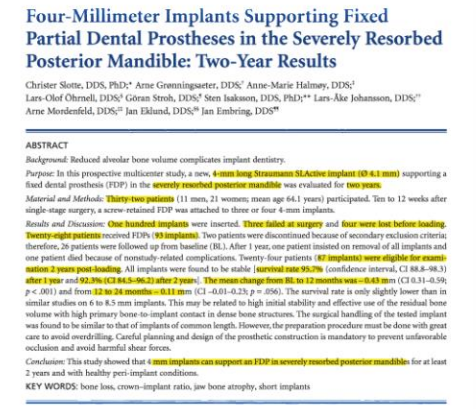
3. European Association for Osseointegration. (2006). Consensus Report: Definitions of implant dimensions. EAO Consensus Conference.


Efficacy and Predictability of Short Dental Implants (< 8 mm): A Critical Appraisal of the Recent Literature

Murali Srinivasan, BDS, MDS, MBA[1]/Lydia Vazquez, MD, DMD[2]/Philippe Rieder, DMD[3]/ Osvaldo Moraguez, DMD[3]/Jean-Pierre Bernard, MD, DMD, Prof Dr med dent[4]/ Urs C. Belser, DMD, Prof Dr med dent[5]


The Effect of Increased Crown-to-Implant Ratio on Single-Tooth Locking-Taper Implants

Rainier A. Urdaneta, DMD, CAGS[1]/Sujey Rodriguez, DDS, MS[2]/D. Cary McNeil, D
Meghan Weed, RDH[4]/Sung-Kiang Chuang, DMD, MD, DMSc[5]


Four-Millimeter Implants Supporting Fixed Partial Dental Prostheses in the Severely Resorbed Posterior Mandible: Two-Year Results

Christer Slotte, DDS, PhD;* Arne Grenningsaeter, DDS;† Anne-Marie Halmøy, DDS;‡ Lars-Olof Öhrnell, DDS;§ Göran Stroh, DDS;§ Sten Isaksson, DDS, PhD;** Lars-Åke Johansson, DDS;** Arne Mordenfeld, DDS;†† Jan Eklund, DDS;‡‡ Jan Embring, DDS¶¶


Consensus Report
Biomechanics/risk management (Working Group 2)

Mariano Sanz
Ignace Naert

Members of Working Group:
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Flemming Isidor
Franck Renouard
Phoebus Madianos
Carlos Madrid
Pascal Marquart
Victor Palarie
Alberto Sicilia
Jose Zurdo
Rafael Juan Blanes


Retrospective Study of Short and Extra-Short Implants Placed in Posterior Regions: Influence of Crown-to-Implant Ratio on Marginal Bone Loss

Eduardo Anitua, MD, DDS, PhD;*† Laura Piñas, Degree of Dentistry;* Gorka Orive, PhD†


CLINICAL ORAL IMPLANTS RESEARCH

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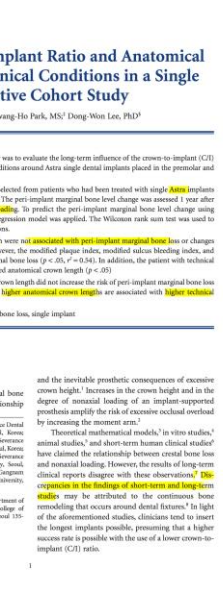
José Alberto López Torres
Michel Dard
Fawad Javed
Carlos Pérez-Albacete Martínez
José Eduardo Maté Sánchez de Val

Case Report
Evaluation of extrashort 4-mm implants in mandibular edentulous patients with reduced bone height in comparison with standard implants: a 12-month results


Effect of Crown to Implant Ratio and Anatomical Crown Length on Clinical Conditions in a Single Implant: A Retrospective Cohort Study

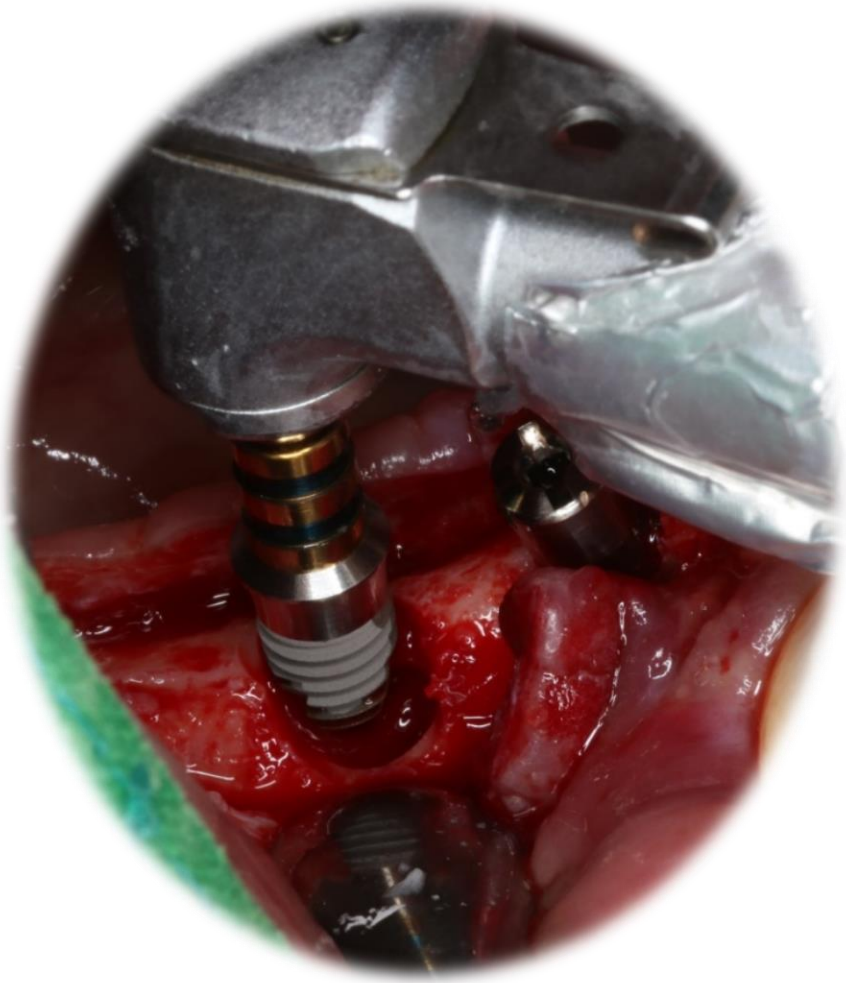
Shan-Pao Sun, MS;* Il-Sang Moon, PhD;† Kwang-Ho Park, MS;‡ Dong-Won Lee, PhD§


Implant Survival and Crestal Bone Loss Around Extra-Short Implants Supporting a Fixed Denture: The Effect of Crown Height Space, Crown-to-Implant Ratio, and Offset Placement of the Prosthesis

Eduardo Anitua, MD, DDS, PhD[1]/Mohammad Hamdan Alkhraisat, DDS, PhD[2]/ Laura Piñas, DDS[3]/Leire Begoña, MSc[2]/Gorka Orive, PhD[2]

Clinical Cases Presentaion

A selection of 10 clinical case examples are included to support the above.



CASE
01

PATIENT INFORMATION
- Gender: Female
- Age: 85
- PMHx: None Significant (N/S)

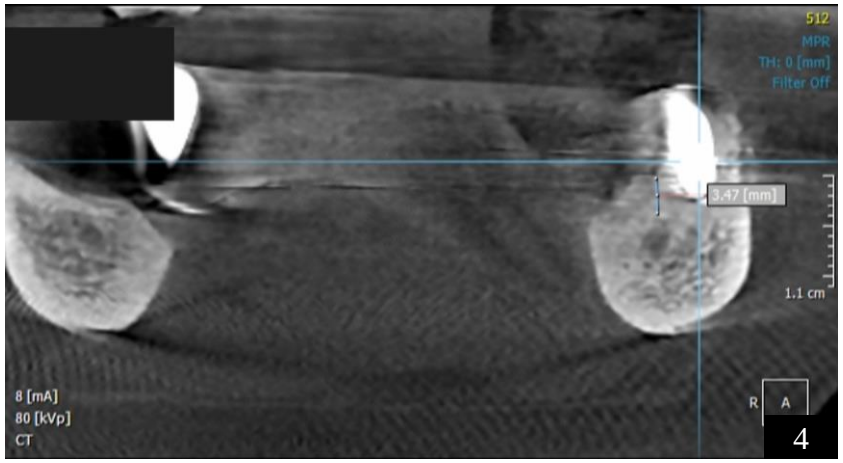
CASE SUMMARY
- The patient underwent removal of an existing implant-supported bridge in the lower left quadrant, followed by bone grafting with a titanium mesh.

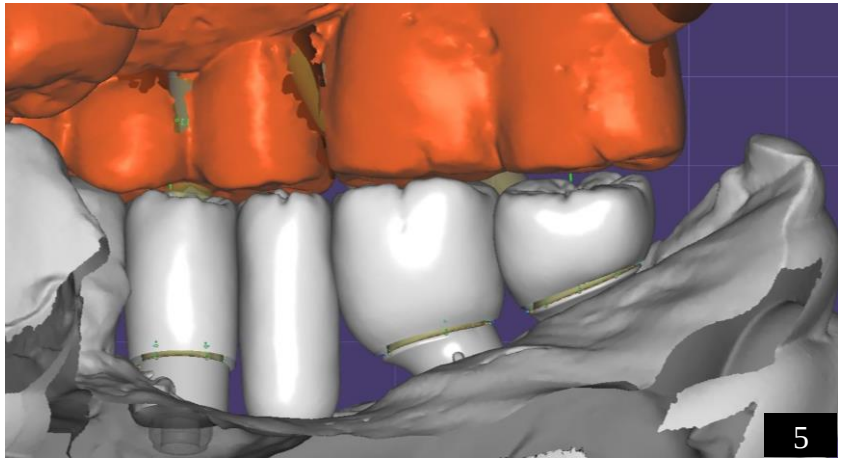
TREATMENT PLAN
- Placement of STERI-OSS Tissue Level Extra Short Implants in positions #34, 36, and 37.

- Fabrication of a 4-unit bridge

OUTCOME
- Implants were successfully placed without injury to the inferior alveolar nerve.

- Impression was taken and the prosthesis fabricated, but the final delivery photograph was unavailable due to the patient's absence.





CASE
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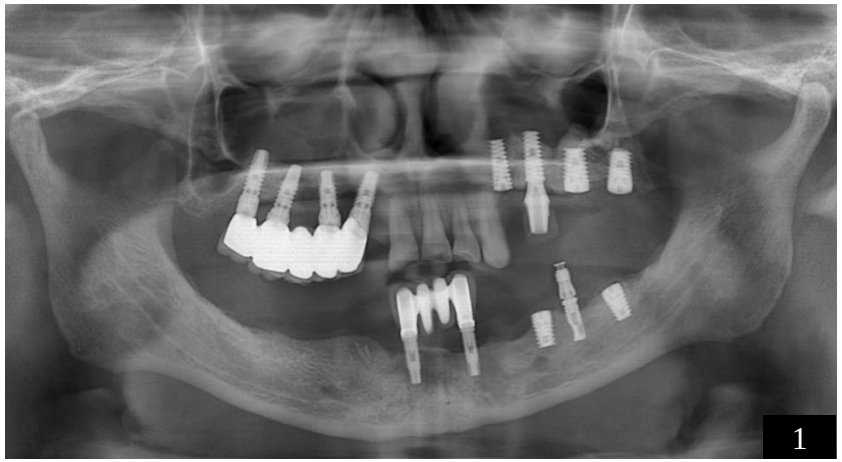

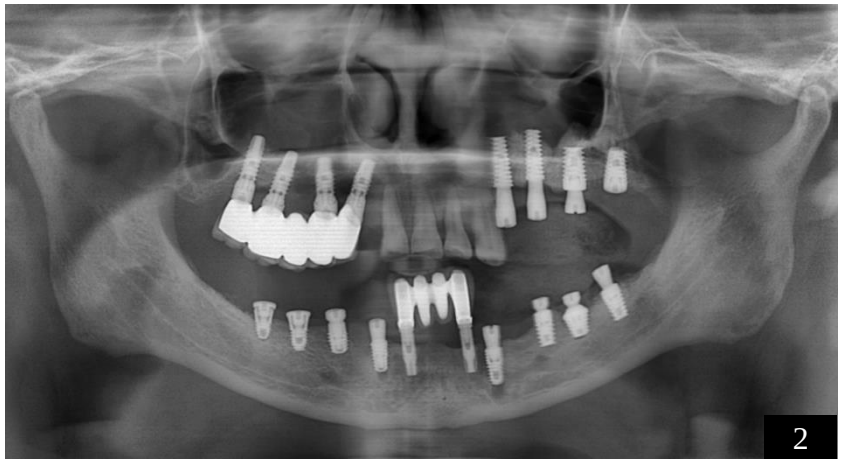

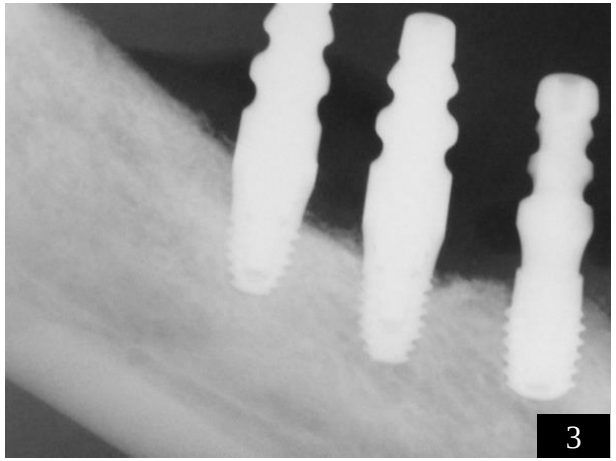

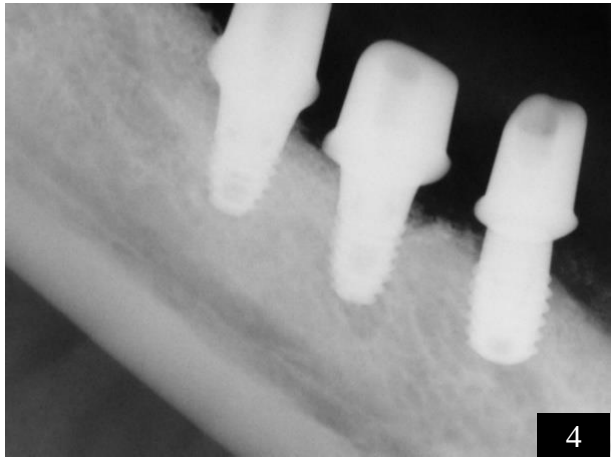

PATIENT INFORMATION

- Gender: Male
- Age: 56
- PMHx: None Significant (N/S)

CASE SUMMARY

- The patient had previously undergone implant placement in the lower right quadrant, but the implant was removed due to persistent numbness and other issues.
- As a result, the patient developed dental phobia and did not receive prosthetic treatment for the remaining edentulous areas.

TREATMENT PLAN

- Placement of multiple STERI-OSS Bone Level and Tissue Level Extra Short Implants in the lower right quadrant
- Placement of appropriate implants in the remaining areas, followed by second-stage surgery on existing implants and prosthetic restoration

OUTCOME

- A stable occlusal relationship was achieved with the completed prosthesis, without any postoperative complications.

CASE
03

PATIENT INFORMATION
- Gender: Female
- Age: 72
- PMHx: None significant (N/S)

CASE SUMMARY
- Long-standing tooth loss in the lower left quadrant.

TREATMENT PLAN
- Placement of STERI-OSS Tissue Level Extra Short implants in positions #36 and #37 to fabricate a prosthesis.

OUTCOME
- Due to significant pain during drilling, SteriOss Tissue Level Short Implants were placed, and a prosthesis expected to provide long-term functional stability was completed.


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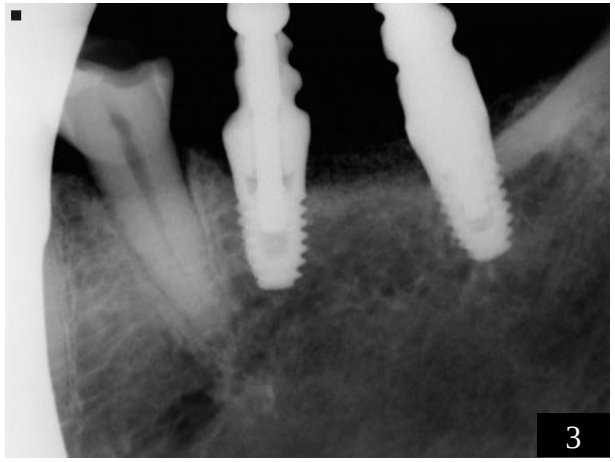
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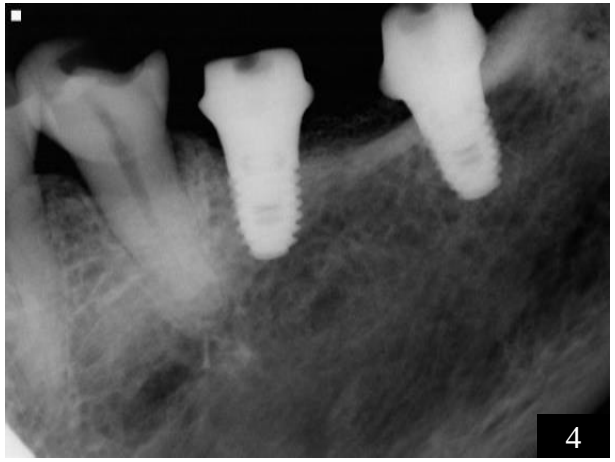
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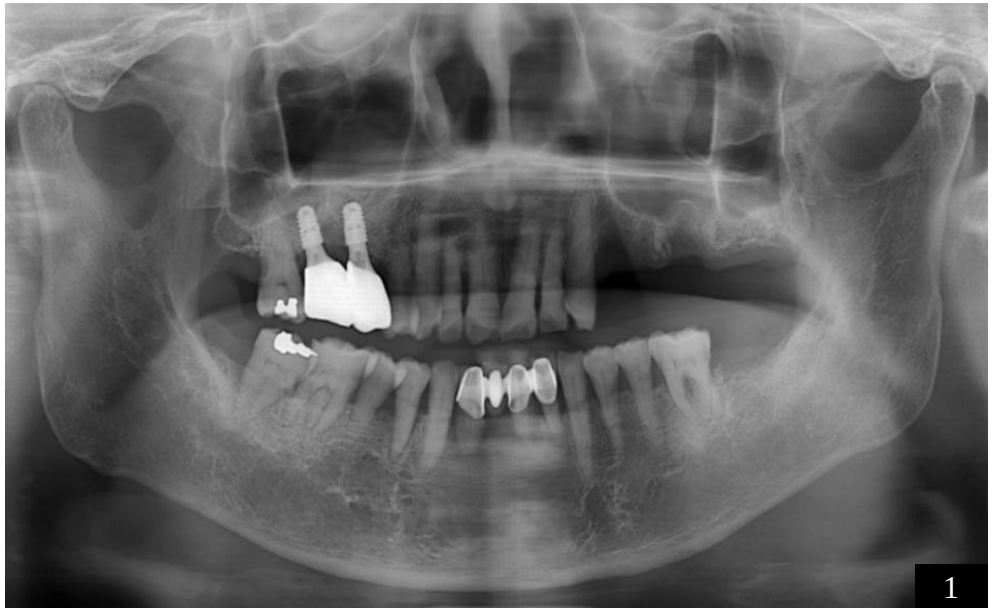
CASE
04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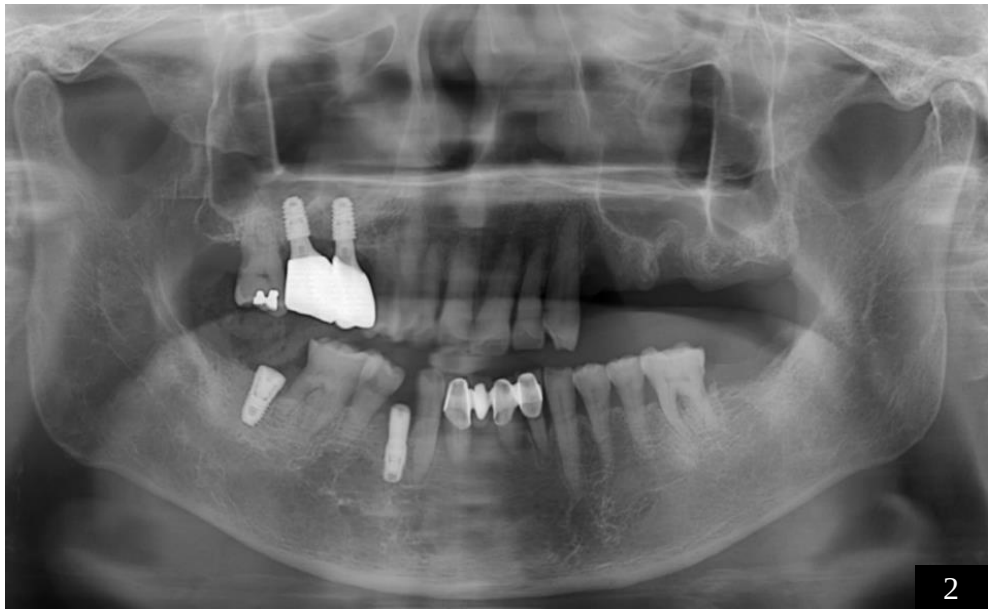
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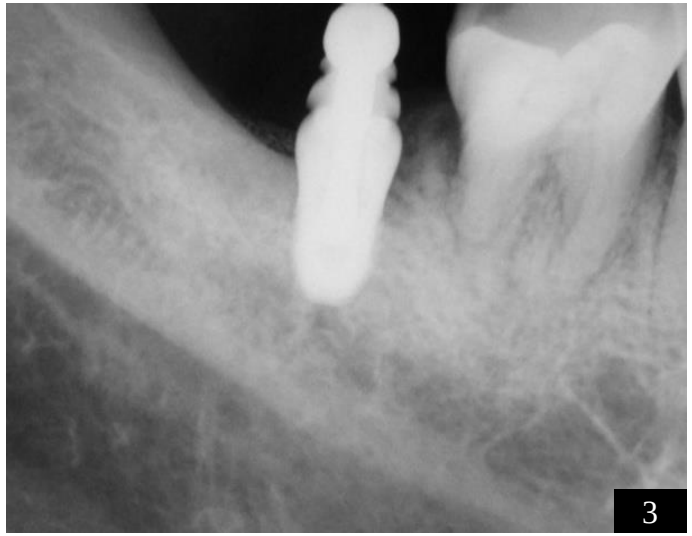
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4

PATIENT INFORMATION

- Gender: Female
- Age: 64
- PMHx: None significant (N/S)

CASE SUMMARY

- Severe chronic periodontitis with high mobility affecting #34 and #37, requiring extraction.

TREATMENT PLAN

- Immediate placement of STERI-OSS Bone Level and Tissue Level Extra Short Implants after extraction.

OUTCOME

- The prosthesis was completed with excellent functional results; however, no final photograph was available due to the patient’s absence.

CASE
05

PATIENT INFORMATION
- Gender: Female
- Age: 68
- PMHx: None significant (N/S)

CASE SUMMARY
- Complete loss of mandibular molars.

TREATMENT PLAN
- Place two STERI-OSS Tissue Level Extra Short Implants in the vertically resorbed lower right area for restoration.

OUTCOME
- Prosthesis completed on the right side; patient did not return for left-side treatment, so no final photo available.


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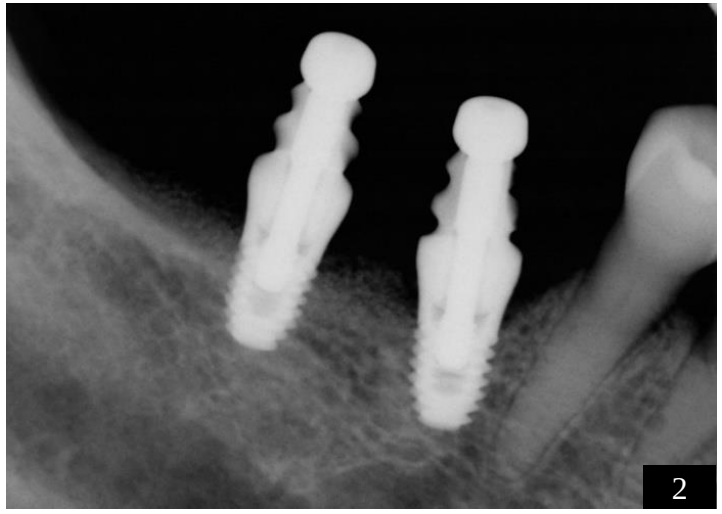
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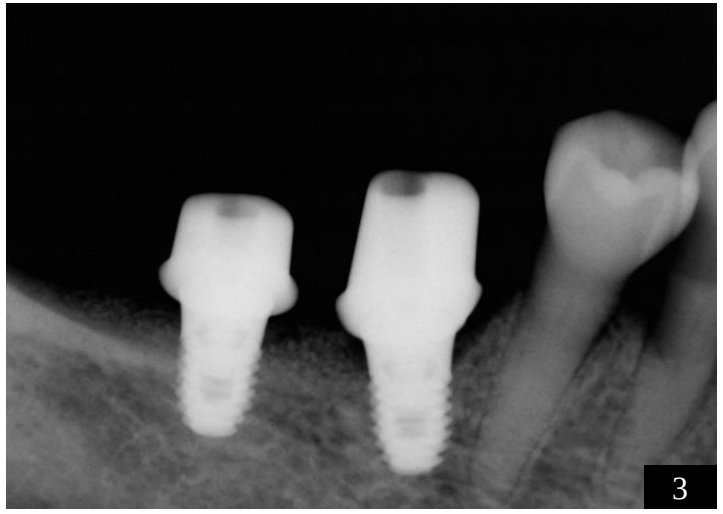
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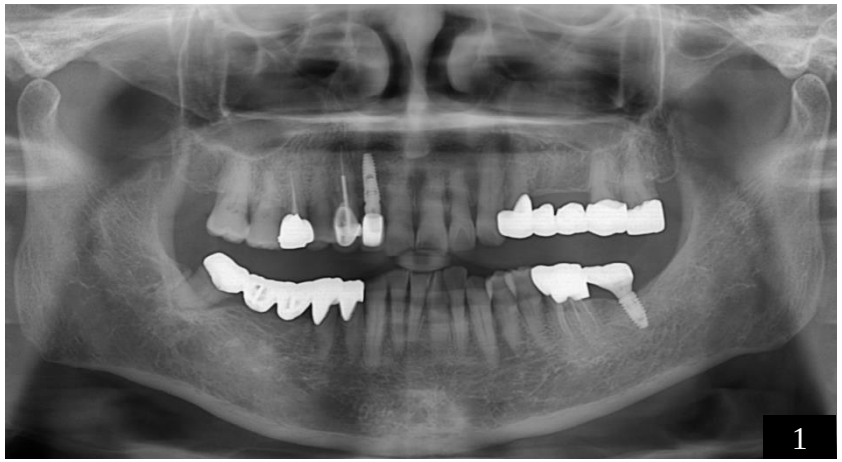

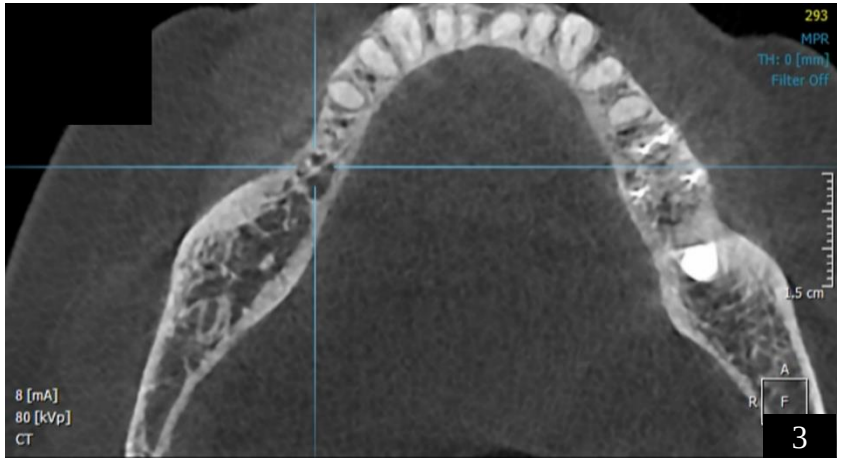

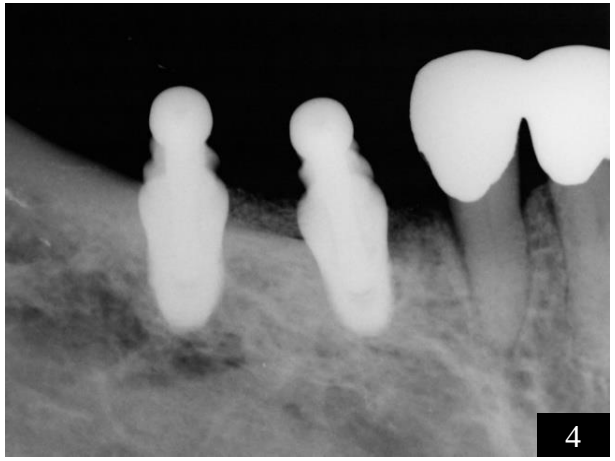

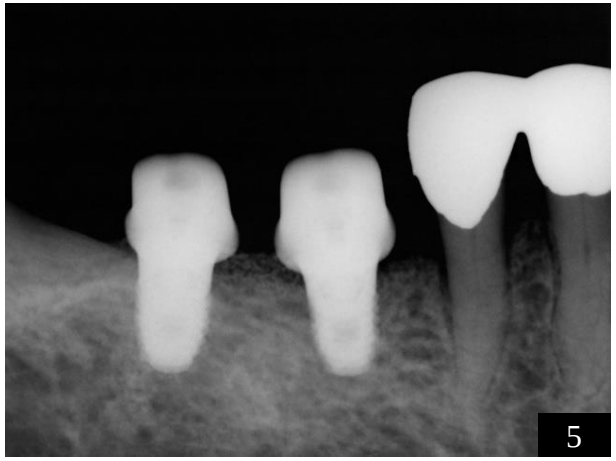

CASE 06

PATIENT INFORMATION
- Gender: Female
- Age: 64
- PMHx: None significant (N/S)

CASE SUMMARY
- Bridge failure in lower right quadrant.

TREATMENT PLAN
- Section bridge distal to #45, recontour the over-bulged pontic area, and place STERI-OSS Tissue Level Extra Short Implant.

OUTCOME
- No complications post-placement, but no final prosthesis photo due to lack of patient follow-up.

CASE
07

PATIENT INFORMATION
- Gender: Male
- Age: 69
- PMHx: None significant (N/S)

CASE SUMMARY
- Reconstruction of missing #46 and #47. #47 close to the inferior alveolar nerve.

TREATMENT PLAN
- Placement of STERI-OSS Tissue Level Extra Short Implant at #47.
- Place Bone Level Implant at #46 and fabricate 2-unit bridge.

OUTCOME
- Restoration completed without issues; final photo unavailable due to missed follow-up.


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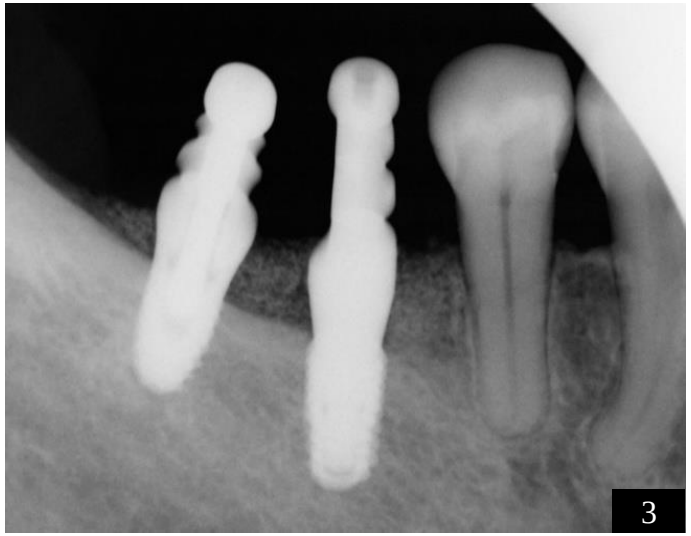
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CASE
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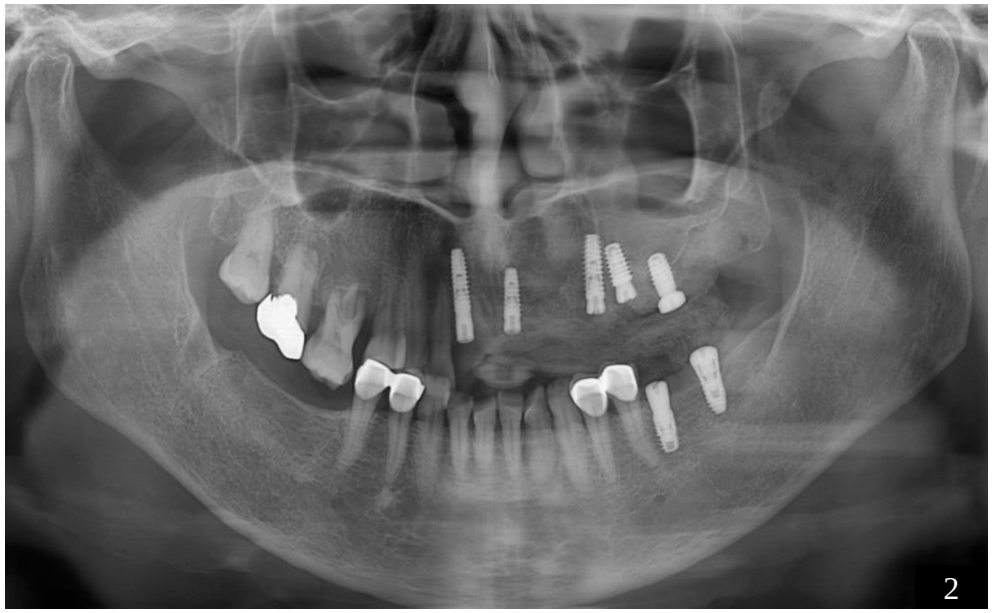
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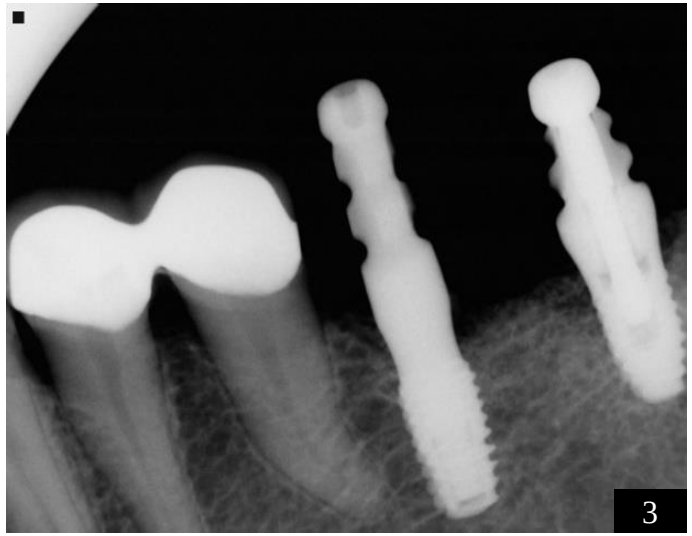
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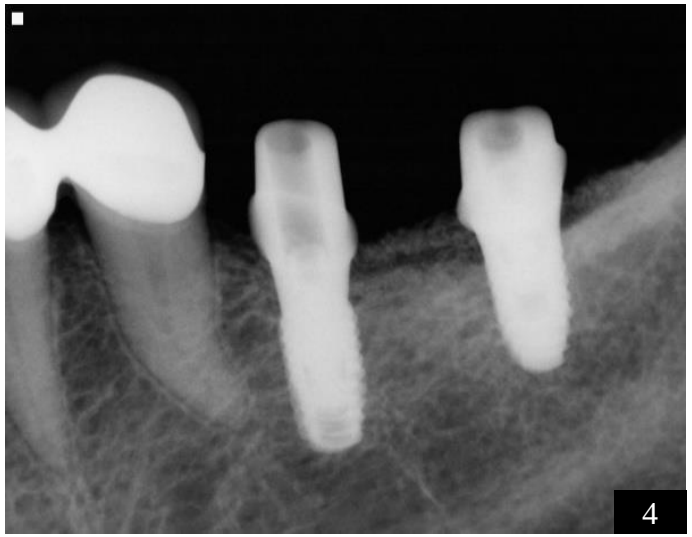
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PATIENT INFORMATION

- Gender: Female
- Age: 75
- PMHx: Chronic periodontitis

CASE SUMMARY

- The patient presented with failure of existing implant prostheses and multiple missing teeth. In the mandible, several teeth were absent, and the remaining teeth had poor prosthetic conditions, necessitating comprehensive oral rehabilitation.

TREATMENT PLAN

- Maxilla: Performed bone grafting in areas of severe bone loss, followed by simultaneous implant placement and prosthetic restoration.

- Mandible: Due to insufficient bone height, a combination of STERI-OSS Bone Level implants and Tissue Level Extra Short Implants was placed, selecting the optimal surgical approach.

OUTCOME

- Restoration completed without any complications, but no final prosthetic photo due to lack of patient’s follow up.

CASE
09

PATIENT INFORMATION
- Gender: Female
- Age: 58
- PMHx: Chronic periodontitis

CASE SUMMARY
- The patient presented with multiple failed implants in the maxilla and multiple missing teeth in the mandible due to chronic periodontitis.

TREATMENT PLAN
- Mandible: Plan to place STERI-OSS Bone Level and Tissue Level Extra Short Implants and deliver an early-loading temporary bridge within one month.

- Maxilla: Remove hopeless implants, perform bone graft and sinus graft, and place several implants. After approximately four months, place additional implants, and two months later, deliver a temporary bridge using implants with good ISQ values. The patient will then be referred back to the requesting dental clinic.

OUTCOME
- Immediately after surgery, the implants demonstrated excellent primary stability and high ISQ values, confirming their reliability. The patient regained normal masticatory function earlier than expected, and the chewing ability was evaluated as highly favorable.


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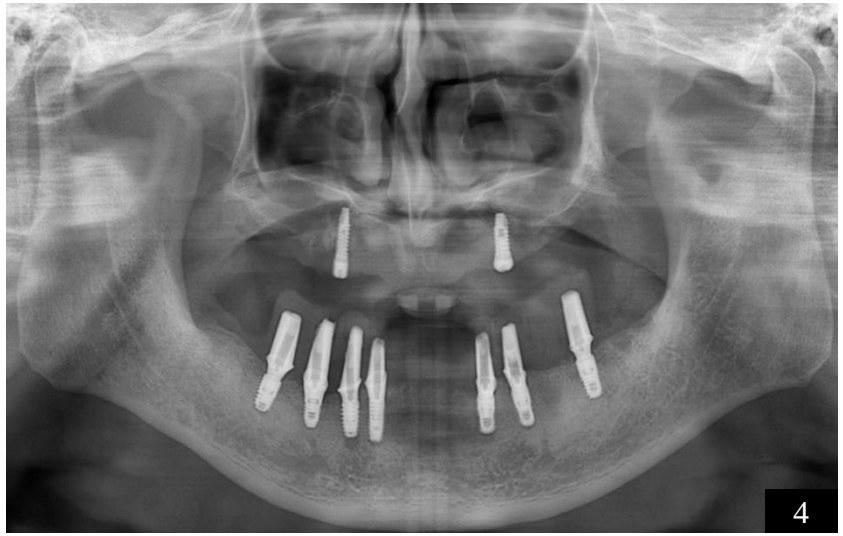
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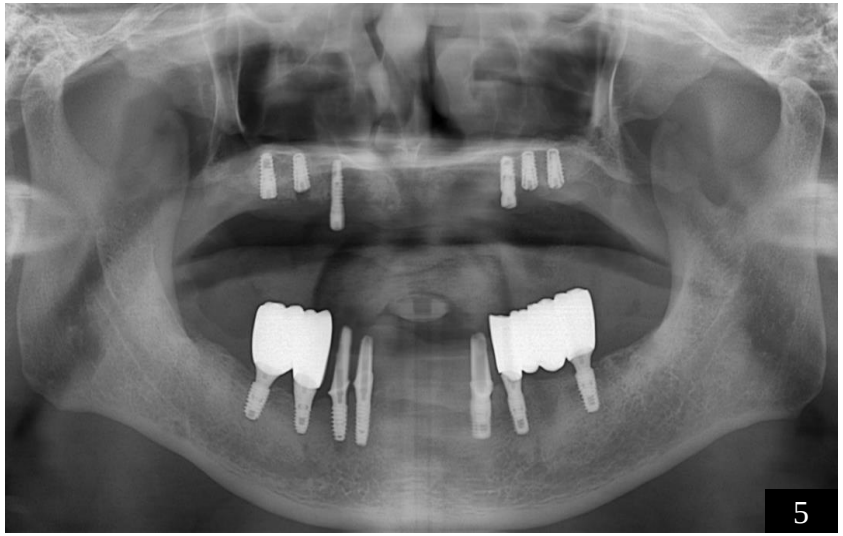
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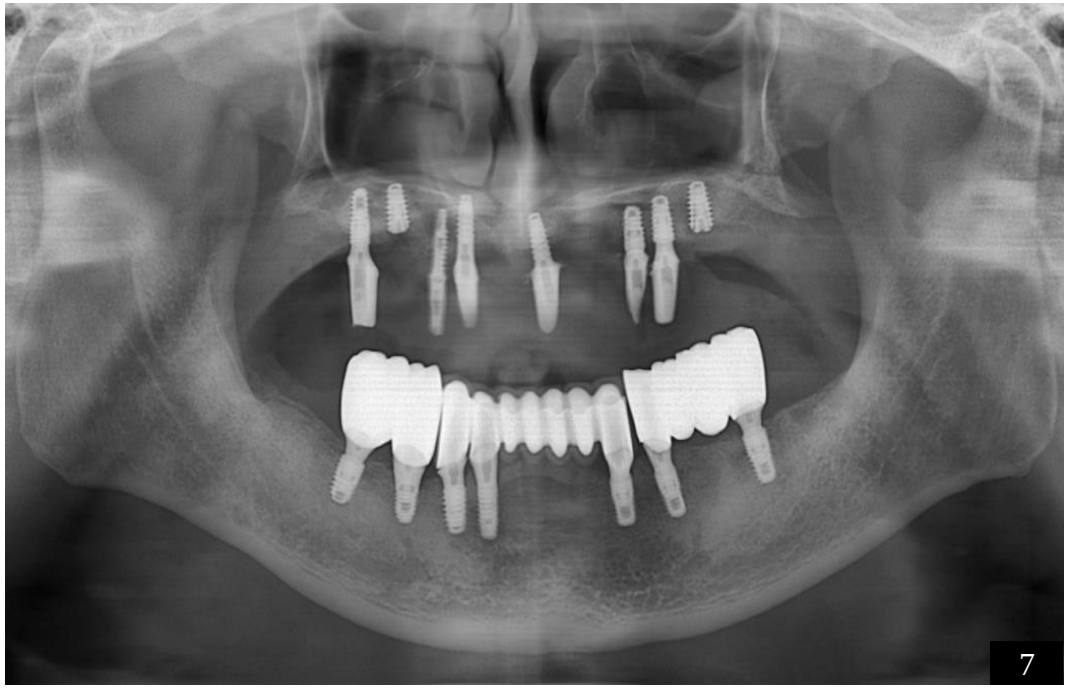
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CASE
10

PATIENT INFORMATION
- Gender: Female
- Age:78
- PMHx: Chronic periodontitis

CASE SUMMARY
- The patient experienced discomfort with the existing denture and requested implant treatment.

TREATMENT PLAN
- Mandible: Place multiple implants in the edentulous areas for fixed restoration. At site #36, plan the use of a STERI-OSS Tissue Level Extra Short Implant to maintain a 2 mm safety distance from the inferior alveolar nerve.

- Maxilla: Place two bone level implants for a magnet overdenture.

OUTCOME
- A prosthesis with a proper occlusal plane was completed in the mandible, while treatment for the maxilla is still in progress.


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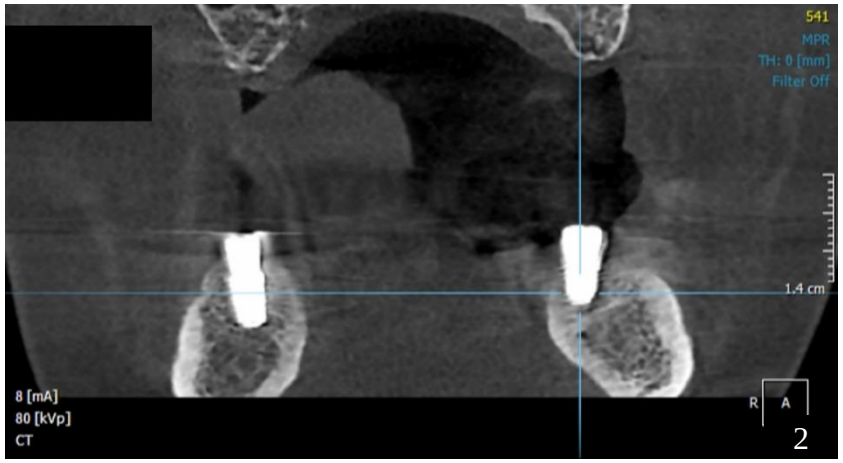

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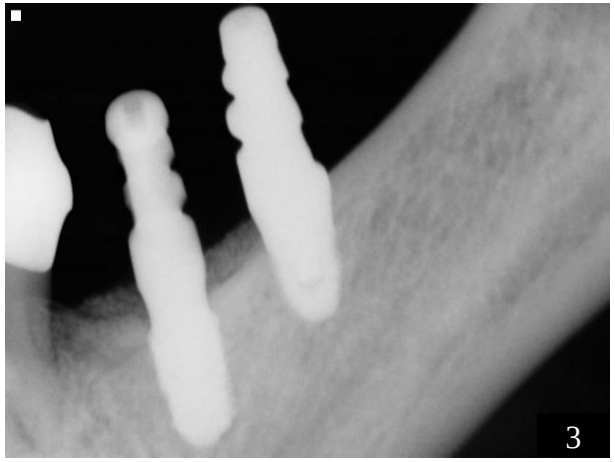
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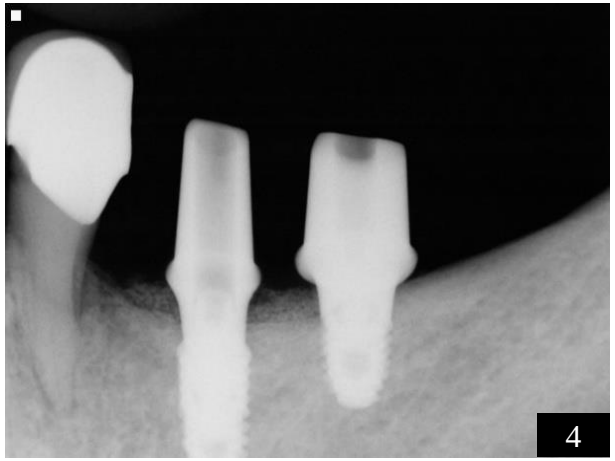
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