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Long-Term Outcomes of Implant Treatment: A Clinical Case with Ten Years of Follow-Up

Angela Gusiyska

Department of Conservative Dentistry, Faculty of Dental Medicine, Medical University – Sofia, Bulgaria
Email: *gusiyska[at]yahoo.com*

Abstract: ***Dental implants are widely regarded as a reliable treatment option for the replacement of missing teeth, with long-term survival rates consistently reported in the literature. However, documenting long-term clinical outcomes remains essential for evaluating the stability of treatment outcomes and identifying factors that may influence biological and mechanical success over time. This report describes a clinical case of planned implant therapy with a ten-year follow-up. The treatment protocol included a comprehensive diagnostic evaluation, surgical placement of endosseous implants, and prosthetic rehabilitation with a fixed restoration. Follow-up assessments were performed at regular intervals, with particular attention to peri-implant tissue health, prosthetic integrity, and functional performance. The ten-year evaluation demonstrated stable osseointegration, preserved peri-implant bone levels, and satisfactory aesthetic and functional outcomes without major complications. Minor maintenance procedures were performed to ensure the longevity of the prosthetic components. This case underscores the importance of meticulous treatment planning, adherence to evidence-based protocols, and structured follow-up in achieving predictable long-term outcomes. It further illustrates how individual case documentation can complement large-scale studies by providing detailed clinical perspectives.***

Keywords: dental implants, implant therapy, long-term follow-up, clinical outcomes, case report

1. Introduction

Dental implants have become an established and predictable treatment modality for replacing missing teeth, offering favourable survival and success rates over extended periods [1,2]. Since their introduction, continuous advancements in implant design, surgical protocols, and prosthetic concepts have contributed to improved clinical outcomes and enhanced patient satisfaction. Long-term data, however, remain essential for validating the durability of these therapeutic approaches and for providing evidence-based guidance for clinical decision-making. While numerous studies have demonstrated high survival rates exceeding 90% after ten years, variations in patient-related, surgical, and prosthetic factors underline the importance of individualised treatment planning and comprehensive follow-up. Kupka et al. present a meta-analysis that summarizes data on the survival and success of dental implants over a 20-year period, emphasizing the importance of long-term monitoring and an individualized approach to patient care [3,4].

Clinical case reports continue to be a valuable contribution to the literature, as they provide insights into treatment protocols and their outcomes within specific clinical contexts. They also enable a detailed evaluation of challenges, complications, and long-term stability under real-life conditions that may not always be accurately reflected in larger cohort studies. Furthermore, longitudinal clinical documentation is particularly relevant in implant dentistry, where biological and mechanical complications can arise gradually and require proactive management [3,5]. Implants inserted into a fully healed and uncompromised alveolar ridge generally achieve excellent survival and clinical success rates [6,7]. The analysis of long-term outcomes indicates that dental implants are associated with a relatively low rate of failure overall. The majority of complications were observed during the first year following placement, with incidence decreasing in the subsequent years regardless of the type of prosthetic rehabilitation. Factors contributing to early implant loss vary and must be thoroughly evaluated and addressed during the presurgical planning stage [8].

This case report presents the ten-year follow-up of a patient treated with a planned implant therapy protocol. The aim is to illustrate the clinical decision-making process, surgical and prosthetic management, and the strategies implemented to ensure long-term functional and aesthetic success. By documenting the course of treatment and monitoring outcomes over a decade, this report seeks to contribute to the growing body of evidence supporting implant therapy as a reliable and sustainable option in restorative dentistry [4,5,9].

2. Case Report

A 61-year-old patient presented to the Dental clinic seeking consultation for implant-supported rehabilitation of the distal regions of the maxilla and distally in the third quadrant. The patient's medical history was unremarkable, with the exception of radiotherapy received ten years previously for a diagnosed lymphoma. The patient was in good general health, and following consultation with the treating oncologist, it was confirmed that there were no contraindications to dental implant therapy. Following a comprehensive clinical and radiographic assessment, a treatment plan was mutually agreed upon with the patient. The rehabilitation commenced with the placement of two implants in the third quadrant to restore posterior support (Fig.1A). In the maxilla, bone-level Straumann implants were placed in the premolar regions, while tissue-level Straumann implants were inserted in the first molar positions to optimise soft tissue management and prosthetic emergence profiles (Fig.1B). In the fourth quadrant, implants were placed following the extraction of bridge abutment teeth, ensuring adequate bone volume and primary stability (Fig.1C).

Throughout treatment, panoramic radiographs and clinical

evaluations were conducted to monitor osseointegration, prosthetic stability, and crestal bone levels (Fig.1 D, E). Two years ago, the final implant (*bone level tapered*) was placed in the region of tooth 23 (Fig.1E), completing the full-arch rehabilitation. All implants demonstrated satisfactory primary and secondary stability, and the patient has been maintained under a structured follow-up protocol to ensure long-term functional and aesthetic outcomes.

This comprehensive approach highlights the importance of careful treatment planning, customized implant selection, and regular monitoring in achieving predictable, long-term success in complex implant rehabilitations.

3. Treatment Protocol and Surgical Procedure

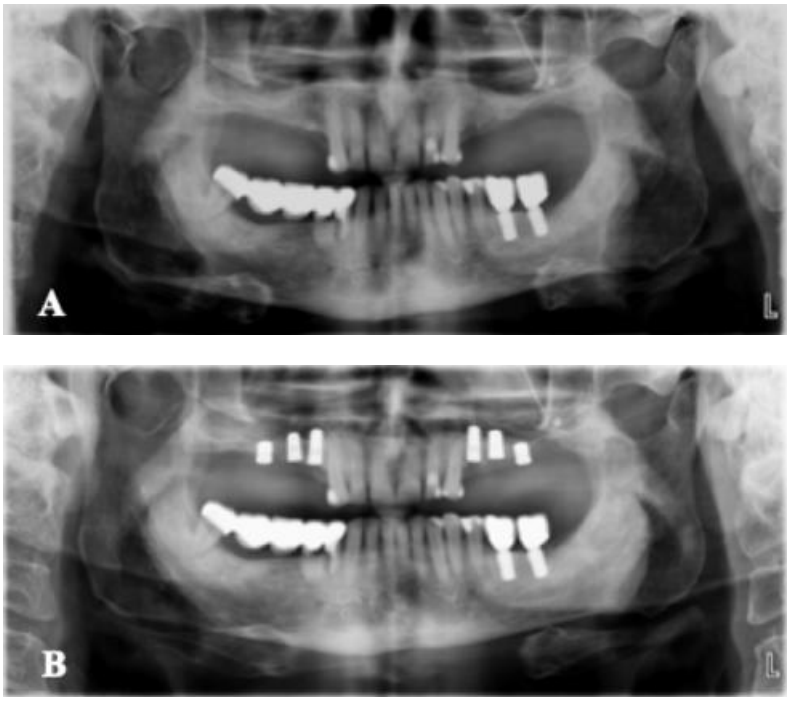
The treatment plan was executed in a staged approach to ensure optimal implant placement and management of the surrounding soft tissue. Initially, two implants were inserted in the third quadrant to re-establish posterior occlusal support. Following local anaesthesia, a full-thickness mucoperiosteal flap was elevated, and the osteotomy sites were prepared according to the manufacturer's protocol for Straumann implants. Two bone-level implants (*diameter 4.8 mm and a length 10 mm*) were placed with primary stability exceeding 55 Ncm. Flaps were sutured using non-resorbable sutures, and a healing period of three months was allowed before prosthetic loading.

In the maxilla, bone-level implants were placed in the premolar regions (*diameter of 4.1 mm, length of 10 and 8 mm*) to support fixed restorations, while tissue-level implants (*diameter 4.8 mm, length 6 mm*) were inserted in the first molar positions to optimise soft tissue contours and emergence profiles. Implant placement was guided by cone-beam computed tomography (*CBCT*) planning and surgical stents to ensure precise angulation and inter-implant spacing. In the fourth quadrant, implants were placed following the extraction of bridge abutment teeth. Careful debridement of the sockets and minimal flap elevation preserved alveolar bone and soft tissue architecture. Implants were allowed a three-month osseointegration period prior to prosthetic restoration.

Regular follow-up visits were scheduled to include clinical and radiographic assessments to monitor osseointegration, prosthetic fit, and crestal bone levels. Minor adjustments to provisional restorations were performed as needed to ensure optimal occlusion and soft tissue adaptation. Two years ago, the final implant was placed in the region of tooth #23, completing the rehabilitation. All implants demonstrated excellent primary and secondary stability, and the patient has maintained satisfactory functional and aesthetic outcomes to date.

4. Discussion

The restoration of missing teeth in the distal region of the dental arches presents varied functional and biomechanical challenges [10,11]. Distal edentulism not only compromises masticatory efficiency but also predisposes patients to overloading of the remaining anterior and premolar dentition, often resulting in occlusal instability, increased wear, and periodontal stress. Traditional restorative options, such as removable partial dentures, frequently fail to provide sufficient stability, comfort, and long-term preservation of oral structures. In contrast, dental implants offer a predictable and contemporary solution that restores occlusal support in the posterior regions, thereby maintaining functional balance and protecting the integrity of the stomatognathic system [4,5,9].



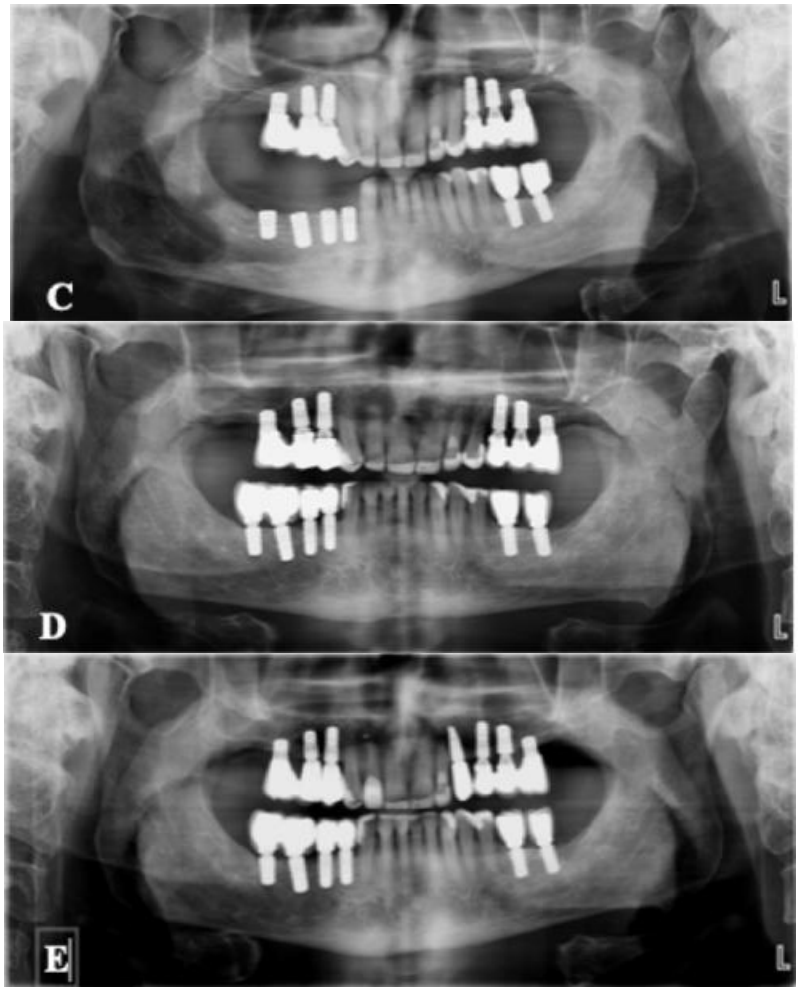
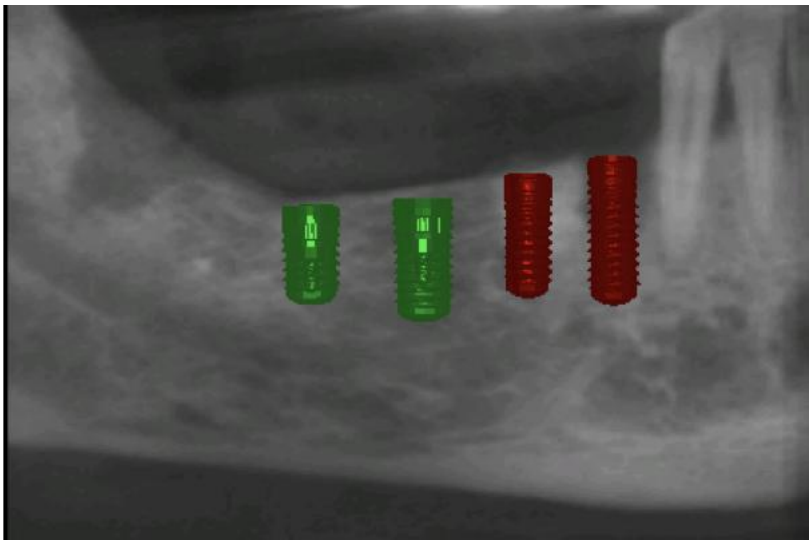


Figure 1: Orthopantomography (*OPG*) observation: **A/** Postoperative OPG after implant placement on #36 and #37 - 11.2014; B/Postoperative OPG after implant placement on the upper jaw; C/ Postoperative OPG after implant placement on the fourth quadrant (#44,45,46,47); D/ Control OPG after complete prosthetic rehabilitation; E/ Control OPG – 10 years follow-up;



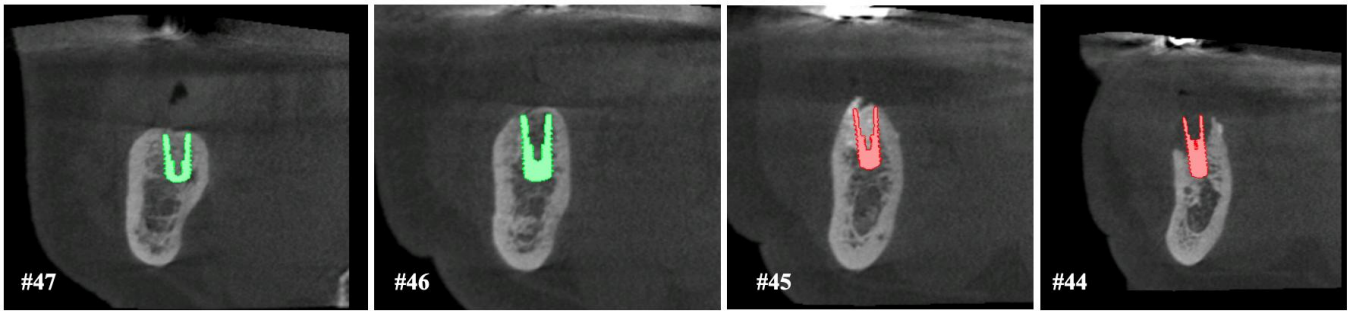


Figure 2: Digital Implantology Planning with CBCT in the fourth quadrant (#44,45,46,47).

The present case, which has been followed for ten years, illustrates the clinical value of implant therapy in addressing distal tooth loss. Schiegnitz et al. conclude that a successful and safe rehabilitation is possible with high implant survival rates, and implantation in the native bone should be preferred among irradiated tumour patients [12].

The re-establishment of posterior support through implant-retained restorations prevented excessive functional loading on the anterior teeth, thereby contributing to their long-term preservation [13, 14]. Moreover, by maintaining posterior occlusion, the treatment likely reduced the risk of developing temporomandibular joint (*TMJ*) dysfunction, which is frequently associated with compromised posterior support and altered mandibular dynamics [15, 16]. The stability of peri-implant tissues and the absence of major prosthetic complications in this case further reinforce the efficacy of implants as a contemporary therapeutic option [17, 18].

From a biomechanical perspective, implant placement in the posterior region ensures a more favourable distribution of occlusal forces along the dental arch. This is particularly relevant in patients with intact anterior dentition, where the preservation of natural teeth is of paramount importance. By reducing functional stress on the front teeth, implant-supported prostheses help to maintain aesthetics, phonetics, and long-term dental health [19, 20, 21].

The ten-year follow-up highlights the importance of comprehensive treatment planning, strict adherence to surgical and prosthetic protocols, and ongoing maintenance. Regular follow-up visits not only ensured the early detection and management of minor issues but also contributed to the longevity of the restoration. This case strengthens the growing body of evidence supporting implant therapy as the treatment of choice for distal regions, providing a stable, functional, and biologically sound alternative to traditional prosthetic options [22, 23].

Ultimately, the clinical outcome underscores the broader significance of implants beyond tooth replacement: they maintain the functional harmony of the stomatognathic system, preserve the natural dentition, and reduce the risk of TMJ complications, thereby enhancing both oral health and quality of life in the long term [24, 25].

5. Conclusion

This clinical case with a ten-year follow-up demonstrates the reliability and long-term stability of implant therapy in the rehabilitation of distal edentulism. The restoration of posterior support through implant-retained prostheses contributed not only to functional efficiency and occlusal balance but also to the preservation of the natural anterior dentition. By re-establishing masticatory function in the distal zone, the treatment reduced the risk of temporomandibular joint dysfunction, which is frequently associated with compromised occlusion and anterior overload.

The ten-year success of this case highlights the critical role of comprehensive diagnostic assessment, accurate surgical placement, and careful prosthetic planning, complemented by regular maintenance and follow-up. These findings further support the view that implant-supported restorations offer a reliable and biologically favourable solution, especially in cases requiring the long-term preservation of function and natural dentition is essential.

In conclusion, this report emphasises the role of implants not only as a method for tooth replacement but also as a preventive strategy that safeguards occlusal stability, protects the temporomandibular joint, and ensures the integrity of the remaining dentition.

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