

Case Report

Successful Rehabilitation with Corticobasal Implants in a Diabetic and Hypertensive Patient with Atrophic Maxillary Alveolar Ridge- Case Report

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Abstract

The loss of dentition can significantly impact an individual's overall well-being, leading to functional, phonetic and aesthetic challenges. Dental implants are commonly used for replacing missing teeth. However, in certain situations, such as atrophic residual alveolar ridges, the placement of conventional dental implants becomes challenging without additional surgeries like bone augmentation, ridge splitting or nerve lateralization. Many patients requiring dental implant treatment are geriatric and they may be unable to undergo complex, multiple surgeries due to medical or financial limitations. In such cases, corticobasal implants offer a highly optimistic treatment option. This case report demonstrates the successful placement of corticobasal implants in a diabetic and hypertensive geriatric patient with an atrophic maxillary alveolar ridge.

Keywords: Strategic Implants; Corticobasal Implants; Full Mouth Rehabilitation; Diabetes Mellitus, Dental Implants

Introduction

Dental implants are among the most commonly chosen solutions for replacing missing teeth, offering long-term predictability and reliability [1]. Rehabilitation with dental implants becomes essential when the remaining dentition is compromised. The most commonly used dental implants are two-piece titanium implants with a treated surface, often referred to as conventional implants. These implants are inserted into the alveolar bone and operate based on the principle of osseointegration, which entails their integration with the bone. Once integrated, they can either be functionally loaded or, in some cases, loaded non-functionally immediately and later on loaded functionally [2]. Their use becomes particularly challenging in cases involving the loss of alveolar bone in both vertical and horizontal directions. To address the deficiency of alveolar bone, additional surgical procedures such as alveolar bone augmentation using bone grafts, ridge

splitting or nerve repositioning may be required. These procedures can lead to increased morbidity, delays in the overall treatment timeline and a rise in the financial cost of treatment [3].

Corticobasal implants on the other hand engage dense cortical bone which does not resorb [4]. The implant engages a minimum of two bone cortices and is based on the principle of osseofixation, a concept commonly employed in orthopedic surgery to stabilize fractured bones [5]. Corticobasal implants are generally of two types highly polished smooth surface implants commonly referred to as Bicortical Screws (BCS) and rough surface single piece compressive screws [6]. Since the implant engage cortical bone, they can be immediately functionally loaded without the need to perform any additional procedures like bone augmentation, ridge split and sinus lifts [7].

Most patients presenting with a loss of vertical height of occlusion are geriatric individuals, who often have a history of lifestyle-related diseases such as hypertension and diabetes mellitus in clinical scenarios. Corticobasal implants offer a significant advantage in such patients, as they can be placed flapless without the need for complex procedures like bone augmentations. This approach minimizes postoperative sequelae, leading to faster recovery times and more rapid masticatory and functional rehabilitation [8].

Hence, considering the advantages of corticobasal implants a maxillary full arch immediate functional rehabilitation with minimal post-operative sequelae was carried out.

Case Presentation

A 65-year-old female patient, with a medical history of diabetes and hypertension, requested an overall improvement in her masticatory function and aesthetics. She provided a previous history of endodontic treatments and prosthetic rehabilitation, both of which have failed over time. She also has a 20-year history of type 2 diabetes mellitus and a 25-year history of hypertension, for which she has been receiving ongoing medications.

Upon clinical and radiographic examination, we observed bite collapse with a loss of vertical height of occlusion, resulting in difficulties with mastication, aesthetics and phonetics (Fig. 1). Full mouth rehabilitation with dental implants was initially planned; however, the patient opted for treatment limited to the upper arch only. A detailed treatment plan was developed, with corticobasal implants chosen due to the lack of sufficient vertical alveolar bone in the posterior maxilla bilaterally (Fig. 2). Diabetes and hypertension monitoring were conducted and the surgical phase was planned only after obtaining clearance from the patient's treating physician. A written informed consent was also obtained from the patient.

Surgical planning was completed and the patient was administered pre-procedural amoxicillin prophylaxis of 2 gm 1 hour prior to the procedure [9]. The surgical field was disinfected with 10% povidone-iodine and pre-procedural mouth rinsing was performed using 0.2% chlorhexidine digluconate. Local anesthesia was achieved through infiltrations and nerve blocks using 2% lidocaine [10].

Once profound anesthesia was achieved, serial extractions were performed. The extraction sites were thoroughly curetted and disinfected with 10% povidone-iodine. Corticobasal Bicortical Screw (BCS) implants were then inserted, engaging the nasal floor, canine fossa, maxillary sinus floor and tuberopterygoid junction. Immediate splinting of the implants was done using 1.5 mm Grade 2 titanium rods and an intraoral syncrystallizer. Dental impressions and jaw relations were recorded and the patient was provided with an interim PMMA prosthesis one day postoperatively. Postoperatively, amoxicillin 500 mg and ibuprofen 400 mg every 8 hourly for 5 days were prescribed [9,11]. A hybrid denture was later fabricated 6 months postoperatively (Fig. 3). An overall improvement in mastication, phonetics and aesthetics was observed at the end of the treatment (Fig. 4).



Figure 1: Pre- operative extraoral view.



Figure 2: Pre-operative intraoral view.



Figure 3: Post-operative intraoral view.



Figure 4: Post-operative extraoral view.

Discussion

Diabetes mellitus is a chronic metabolic disorder that impacts osteoblastic activity, reduces calcium and phosphate metabolism and increases osteoclastic activity. This leads to a reduction in callus formation, which ultimately hampers the healing process in dental implants [12]. Considering the patient's overall health status, age and the benefits of corticobasal implants, we opted for corticobasal implants over conventional implants. This decision was made because type 2 diabetes mellitus has a more pronounced effect on alveolar bone than on cortical bone [13,14]. The load-bearing capacity of cortical bone is higher than that of alveolar bone. Additionally, cortical bone is resistant to resorption and infections, making it a more stable and durable option for implant placement [15].

Corticobasal implants are specifically designed to be placed in cortical bone and can be immediately loaded, regardless of the quantity or type of overlying cancellous bone. This makes them particularly advantageous in cases with limited bone availability [16]. The design and surface characteristics of corticobasal implants offer the additional advantage of atraumatic insertion, as osteotomy is typically prepared using a single drill in most cases. The highly polished surface of these implants helps prevent biofilm accumulation, thereby reducing the risk of periimplantitis, even when placed in infected sockets [17].

Full mouth rehabilitation using corticobasal implants and its long term success depends upon few fundamentals. First, loading within 72 hours is crucial, as alveolar bone remodelling begins within this period postoperatively [18]. Therefore, it is imperative to either load the implants with a rigid prosthesis or, if immediate loading is not feasible, it is advisable to rigidly splint the implants using an intraoral syncrystallizer. Secondly, the long-term stability of the prosthesis depends significantly on the surgical technique. Implants must be placed within an imaginary polygon, ensuring that the final implant placement must include a posterior and anterior stops. This posterior stops can be achieved by either engaging the sinus floor at the region of the second molar or the posterior wall of the maxillary sinus or the tuberopterygoid junction bilaterally or a combination of any of the three [19]. Additionally, bilateral engagement of implants in the canine fossa is imperative to achieve anterior stops, along with a few implants can be placed anterior to the canine fossa, which is essential for anteroposterior spread of implants for optimal stability and support of the prosthesis [20].

Conclusion

In conclusion, this case report highlights the successful placement of corticobasal implants and the effective functional and aesthetic rehabilitation of a patient with chronic type 2 diabetes mellitus and hypertension. The case presented a challenging scenario, where the placement of conventional dental implants in native bone would not have been feasible without a bone augmentation procedure. BCS implants, with their highly polished and smooth surface, require minimal surgical instrumentation for placement. Additionally, they can be inserted flaplessly, minimizing postoperative sequelae and are resistant to periimplantitis, making them a suitable option in compromised situations like this.

Conflict of Interest

There are no conflicts of interest that may have influenced the research, authorship or publication of the article.

Financial Disclosure

No financial support was received for the writing, editing, approval or publication of this manuscript.

Declaration of Patient Consent

Written consent was obtained from the patient.

Ethical Statement

This project was exempt from IRB review as it did not qualify as human subject research under federal regulations.

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