Basal Implants for Partial Rehabilitation of Atrophic Maxilla and Mandible: An Interdisciplinary Case Report

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ABSTRACT

Background: Management of patients with severely periodontally compromised and advanced ridge resorption poses significant challenges for fixed prosthetic rehabilitation. Basal implants offer a predictable solution by engaging cortical bone and eliminating the need for bone grafting.

Aim: This case report presents the successful partial-mouth rehabilitation of a severely periodontally compromised patient using six single-piece basal implants, with immediate functional loading.

Case Description: The patient underwent extraction of hopeless teeth followed by flapless placement of six basal cortical implants in both maxillary and mandibular arches. Cement-retained fixed partial dentures were delivered within 72 hours. Bone levels were measured immediately post-placement and after 6 months to assess stability.

Results: Excellent primary stability was achieved, with no signs of peri-implant pathology. Radiographic evaluation showed minimal bone loss at the 6-month follow-up.

Conclusion: Basal implants demonstrate excellent clinical performance in patients with compromised ridges and provide immediate functional restoration without the need for augmentation. Their unique structural design allows placement even in reduced bone volume, offering a reliable alternative to conventional implantology.

Keywords: Basal implants, partial-mouth rehabilitation, immediate loading, bicortical anchorage, atrophic ridge

INTRODUCTION

Rehabilitation of patients with moderate to severely atrophic jaws using conventional implantology often necessitates extensive procedures such as bone grafting, sinus lift, and guided bone regeneration. These interventions are not only invasive and costly, but they are also associated with increased morbidity, extended treatment duration, and variable success outcomes [1,2].

In such scenarios, basal implantology—also known as bicortical or cortical implantology—has emerged as a minimally invasive and highly reliable alternative. This system utilizes the basal cortical portion of the jawbone, which is more resistant to resorption and infection, providing superior primary stability [3]. Basal implants are single-piece, screwable devices that are inserted into dense cortical bone areas such as the pterygoid plate, palatal wall, nasal floor, or lingual cortical plate, thereby bypassing the need for bone augmentation [4].

Originally developed by Dr. Stefan Ihde, the concept of Strategic Implantology® has advanced the clinical utility of basal implants, especially in cases where conventional implants would fail due to inadequate bone volume [5]. These implants allow immediate functional loading, reduce postoperative discomfort, and eliminate the waiting period typically required for osseointegration in traditional systems [6].

While basal implants have demonstrated promising outcomes, scientific literature remains limited, particularly in the context of partial rehabilitation using immediate-loading protocols in patients with severely resorbed jaws. This case report illustrates a successful example of flapless placement of six basal implants with immediate prosthetic loading in a patient with advanced periodontal disease and severe ridge atrophy.

History of the Basal Implants

The concept of basal implantology originated in the early 1970s, with the development of the first single-piece endosseous implant by Dr. Jean-Marc Julliet in 1972 [7]. This prototype, although functionally viable, lacked standardized surgical instrumentation and homologous cutting tools, making its clinical application highly technique-sensitive and operator-dependent. Subsequent advancements occurred in the mid-1980s when Dr. Gérard Scortecci, a French oral surgeon, introduced an improved basal implant design equipped with dedicated instrumentation and cutting tools, which significantly enhanced its clinical versatility [8]. Dr. Scortecci's innovation led to the development of disk-shaped implants, which were capable of engaging cortical bone laterally, thereby offering increased anchorage and immediate stability.

By the mid-1990s, implantologists in Germany began refining the design of these disk implants further. A collaborative group of clinicians and engineers expanded upon Scortecci's principles and introduced newer implant forms that provided bicortical stabilization and allowed immediate functional loading. These developments culminated in the birth of what is now termed the modern basal osseointegrated implant (BOI) or lateral basal implant, characterized by its single-piece structure, flapless insertion, and mechanical anchorage in corticalized bone regions[3].

This progression laid the foundation for the contemporary Strategic Implant® system, which combines principles of biomechanics, minimal invasiveness, and functional prosthetic loading—all tailored for atrophic jaws and compromised bone conditions [5,6].

Rationale of Using Basal Implants

The human jawbone comprises two distinct anatomical zones: the alveolar (crestal) bone and the basal (cortical) bone. Teeth are naturally embedded in the alveolar bone, which is composed primarily of trabecular (spongy) bone, making it less dense and more metabolically active. Following tooth loss, this bone undergoes progressive resorption due to lack of functional stimulation, resulting in a gradual loss of height and width of the residual ridge [9].

In contrast, the basal bone lies beneath the alveolar ridge and constitutes the core foundation of the maxilla and mandible. It is characterized by a dense, highly corticalized structure, making it significantly more resistant to resorption and infection. Unlike alveolar bone, the basal bone remains relatively stable even years after tooth extraction [10].

Conventional implant systems are designed to engage the alveolar bone. However, in cases of severe ridge atrophy, placement becomes challenging or may necessitate bone augmentation procedures to recreate adequate volume. Moreover, the quality of alveolar bone (Type III or IV in many cases) often compromises implant stability and long-term success [11].

Basal implants, on the other hand, derive anchorage from the basal cortical bone, enabling their placement in regions of compromised vertical or horizontal bone volume. These implants are specifically engineered for bicortical or multicortical engagement, allowing immediate functional loading even in patients with severely resorbed ridges. Their use eliminates the need for grafting and enhances both mechanical stability and infection resistance, making them a superior choice in compromised cases [12].

Thus, basal implants represent a paradigm shift in implantology, focusing on mechanical anchorage rather than biological osseointegration alone, and offer a long-term, graft-free, and prosthetically driven solution for oral rehabilitation. A prospective clinical case was undertaken to evaluate the effectiveness of immediate functional loading using Strategicbasal implants (BCS) for partial-mouth rehabilitation.

Case Report

A 59-year-old female with normal gait and general health reported to the Department of Periodontology and Oral Implantology with the chief complaint of difficulty in chewing, primarily due to mobile mandibular anterior teeth. Intraoral examination revealed the presence of 16 remaining teeth, among which the lower anterior segment exhibited Grade III mobility, associated with advanced periodontal disease [Figure 1 and 2].

The patient's medical history was non-contributory, and she expressed a preference for a fixed, minimally invasive, and time-efficient treatment. After discussing multiple options—including:

- Splinting of mobile teeth
- Removable complete denture following full-mouth extraction
- Conventional implant-supported fixed prosthesis (with prior bone augmentation)
- Implant-supported overdenture (post-augmentation)
- Basal implant-supported fixed prosthesis. Patient elected for partial rehabilitation using basal implants, avoiding the need for grafting or staged surgery.

After obtaining informed consent, routine hematological investigations were conducted and found to be within normal physiological limits. Under local infiltration anesthesia (2% lignocaine with 1:80,000 adrenaline), the procedure was initiated without mandibular nerve block to preserve intraoperative neurosensory feedback. The remaining periodontally hopeless teeth were atraumatically extracted. [Figure-3,4] followed by thorough socket curettage and irrigation using povidone-iodine solution.

Basal implants were first delivered in the mandibular arch following atraumatic extraction of periodontally compromised anterior teeth. No flap elevation or sutures were required, minimizing postoperative morbidity.[Figure 6] The procedure was continued in the maxillary edentulous area followed by mobile FPD removal which was previously anchored on 22, 25 and conventional implant w.r.t 26, conventional implant i.r.t.26 was well osseointegrated with good stability[Figure-8] Lateral incisor and premolars were periodontically compromised and were extracted. Post-extraction 4 implants were inserted i.r.t. 22, 23,27 and 28 through the alveolar crest to engage the basal cortical bone of the nasal floor and palatal cortex and pterygoid plate, ensuring primary mechanical stability. [Figure 9]

A periodontal probe was used to confirm sinus bypass in the tubero-pterygoid region, demonstrating safe access to the pterygoid plate and avoidance of sinus perforation. [Figure 10] A basal implant was inserted in the tubero-pterygoid region, engaging the pterygoid process to maximize posterior support, which is critical in atrophic maxilla cases.[Figure 11] Single sitting RCT were performed i.r.t. 11,21 on 2nd post operative day.The intraoral view following complete implant placement in both arches showed good primary stability and favorable implant positioning.[Figure 12]

At third day when patient reported to department basal implant i.r.t. left lateral (22) incisor was mobile and got extracted, So in the region of the left lateral incisor, bone grafting and PRF (platelet-rich fibrin) were placed to enhance osseous healing and soft tissue regeneration in an area of compromised bone support sutures were placed. [Figure 13]
On 10thpostimplant insertion day, a metal-ceramic fixed prosthesis was delivered, ensuring bilateral occlusal contacts, esthetic alignment, and functional efficiency.[Figure 14]

A postoperative orthopantomogram (OPG) confirmed the proper angulation, cortical engagement, and integration of the implants in both arches.[Figure 15]

- The patient tolerated the procedure well, reported minimal discomfort, postoperative instructions given.
- Avoid brushing the surgical area for the first 24 hours.Begin gentle rinsing with 0.12% chlorhexidine mouthwash twice daily from the second day for 7–10 days.
- Resume soft brushing with a small-headed toothbrush around the prosthesis from the third postoperative day using non-abrasive toothpaste.
- Use interdental aids (proxy brushes or super floss) as advised, avoiding trauma to soft tissue.
- Soft diet recommended for the first 48–72 hours. Refrain from eating hard, sticky, or fibrous foods (e.g., nuts, candies, raw vegetables) for 2–3 weeks.
- Complete course of antibiotics and analgesics were prescribed.
- Avoid vigorous spitting, rinsing, or drinking through a straw for 24 hours to prevent pressure changes.

Figure 1: Preoperative Clinical views

Figure 2: Preoperative OPG View

Figure 3: Extraction of Lower Mobile Incisors

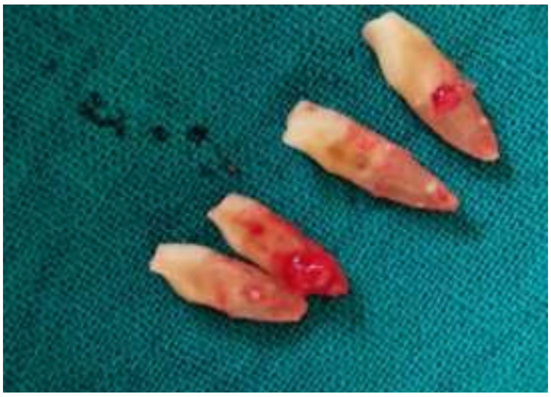


Figure 4: Extracted Lower Incisors

Figure 5: Osteotomy Site Preparation for Basal Implant Insertion

Figure 6: Irrigation and curettage in extraction sockets

Figure 7: Intraoral View Showing Basal Implant Delivery In Themandibular Arch

Figure 8: Mobile maxillary prosthesis removed from 2nd quadrant and from conventional implant w.r. t. 26

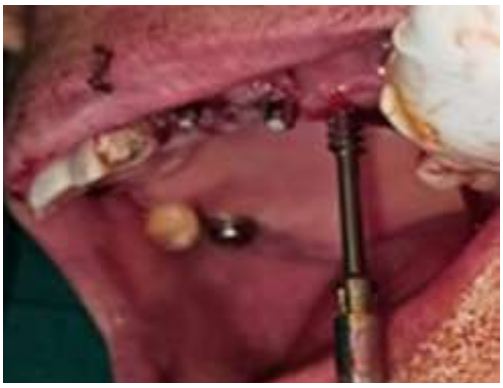


Figure 9: Intraoral view showing basal implant delivery in themaxillary arch.

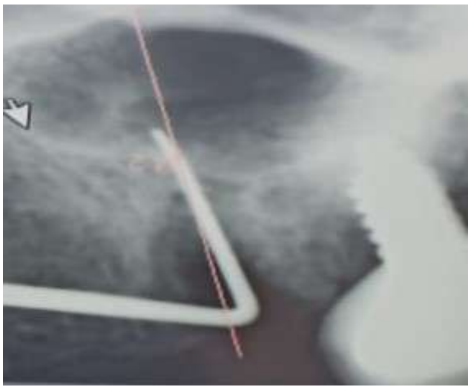


Figure 10: Surgical probe demonstrating access in the tubero-pterygoid area, confirming sinus clearance.

Figure 11: Basal Implant Placement In The Tubero-Pterygoid Region, Engaging The Pterygoid Plate For Cortical Support

Figure 12: Intraoral view following the placement of all implants in both arches.

Figure 13: Placement of bone graft and platelet-rich fibrin (PRF) in the region of the left lateral incisor to enhance soft and hard tissue healing.

Figure 14:Intraoral View Showing Final Metal-Ceramic Prosthesis In Place After Rehabilitation

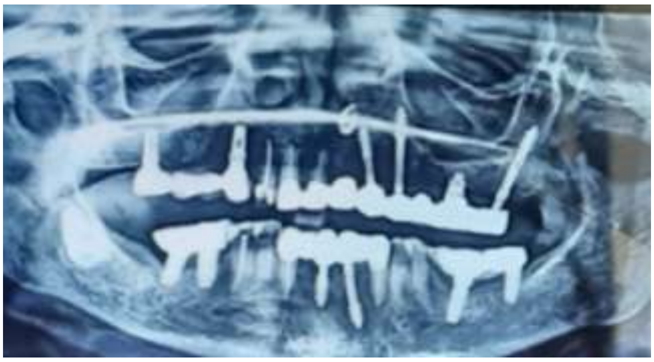


Figure 15:Postoperative panoramic radiograph (OPG) showing the final position of basal implants in the maxilla and mandible with prosthesis in situ.

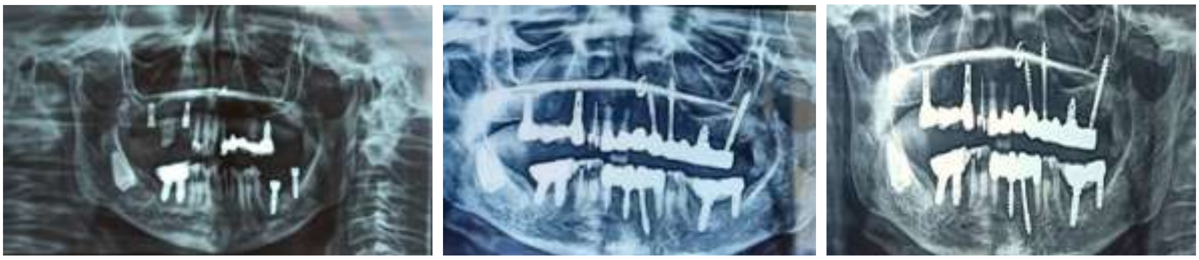
Maxillary and mandibular impressions were made using additional silicone impression material, and tentative jaw relations were recorded using wax. On the 2nd day, after the adjustment of metal framework in the patient's mouth and completion of successful metal try-in, definitive intermaxillary records were made.

On the 3rd day, all the implants (except left lateral incisor) were functionally loaded with both maxillary and mandibular cement-retained metal-ceramic fixed partial denture, providing bilateral balanced occlusion [Figure 12,13].
Day 0 – Diagnosis/extraction

- Day 1 - Implant placement in Maxillary and Mandibular arch i.r.t. 41
- Day 2 - Single sitting RCT performed 11, 21
- Day 3 – Failed basal implant i.r.t. 22 was retrieved and Bone graft+ PRF placed.
- Day 10th – Prosthesis delivery
- 3 month – Follow up
- 6 months – Follow-up

31
22 23 25 27

R**adiographic comparison** between Day 0 and 6-month OPG.



Day -0 **Day-3 month follow up** **Day-6 month follow up**

Figure-16

At the 6-month follow-up, the patient reported a VAS score of 9/10 for functional satisfaction and 8/10 for esthetic satisfaction, indicating a high level of acceptance and comfort with the prosthesis.

In the maxillary second quadrant, a hybrid prosthetic approach was employed, wherein the definitive prosthesis was supported by a combination of both basal implants and conventional (crestally placed) implants. This interdisciplinary strategy was chosen to optimally utilize available bone anatomy and achieve a balance between mechanical stability (from cortical engagement of basal implants) and biological osseointegration (from conventional implants). Althoughthis required meticulous planning to overcome the biomechanical and prosthetic challenges associated with combining two distinct implant systems.”The design allowed for immediate loading while also maintaining favourable stress distribution across varied implant types.

DISCUSSION

Biomechanical and Physiological Basis of Basal Implantology
Bone in the human body is a dynamic, metabolically active tissue that constantly undergoes remodelling in response to mechanical and physiological stimuli. This biological behaviour enables bone to adapt to changes in function, loading, and environment through continuous resorption and formation.

One of the most foundational principles guiding this phenomenon is Wolff's Law, proposed by Julius Wolff in the 19th century. It postulates that bone grows and remodels along the lines of mechanical stress. Consequently, bone that is subjected to regular loading becomes stronger and denser, whereas bone that is devoid of functional stimulation gradually undergoes atrophy [13]. This principle is particularly relevant in edentulous patients, where alveolar bone resorption follows tooth loss due to a lack of mechanical stimulation.

Basal implantology, unlike conventional crestal implant systems that rely on osseointegration in spongy bone, utilizes the dense, highly corticalized basal bone. It adopts "osseofixation," a concept parallel to orthopedic implantology, where immediate mechanical stability is achieved by anchoring implants directly into stable cortical bone without waiting for biological integration [3].

This approach blends the principles of orthopedic surgery with dental rehabilitation, providing a unique interface where implants stimulate the bone through immediate functional loading. This stimulation activates the Bone Multicellular Unit (BMU), initiating reparative osteogenesis around the implant. Over time, this leads to "osseoadaptation" — the process through which bone remodels itself in response to continuous mechanical forces, enhancing the density and architecture of the peri-implant bone [14].

The concept of the "fourth dimension" in implant physiology refers to the ongoing temporal process of bone remodeling and adaptation throughout the life of the implant. Functional loading of basal implants triggers bone densification and contributes to long-term mechanical stability, minimizing the risk of peri-implant bone loss [15].

Given that bone remodeling begins within 72 hours of implant loading, it is crucial to rigidly splint the implant-supported metal framework as early as possible. This distributes masticatory forces efficiently across multiple cortical regions, reducing stress concentration and promoting uniform load transmission. In the present case, six basal implants were placed in the maxillary jaw using a flapless, hand-grip technique, ensuring precise engagement with the basal bone structures [10].

Basal implants provide a reliable solution for supporting both single and multiple-unit restorations in the maxilla and mandible. Their design allows for placement in both fresh extraction sockets and healed ridges, even when bone height or width is compromised. Due to their structural advantage and cortical engagement, they eliminate the need for grafting procedures and offer immediate loading protocols.

This technique is particularly advantageous in cases where unpredictable augmentation would otherwise be required with conventional (crestal) implants. Basal implantology serves as a patient-centric approach, offering faster treatment timelines, minimal invasiveness, and high functional outcomes. Despite its growing success among pioneering clinicians in India and worldwide, widespread adoption is still limited by hesitancy among practitioners to transition from conventional implant systems to this advanced modality.

With proper training and case selection, basal implants offer a paradigm shift in dental implantology, promoting evidence-based, graft-free, and efficient rehabilitation strategies for atrophic ridges [16].

Comparison and Limitation

Sr.no.	Parameter	Crestal Implants (Conventional)	Basal Implants (Cortical/Bicortical)
1.	Placement Location	Placed in alveolar (crestal) bone	Anchored in basal cortical bone
2.	Bone Requirement	Requires adequate height and width of alveolar bone	Suitable for atrophic ridges with minimal bone
3.	Number of Surgical Steps	Usually two-stage or delayed loading	Often single-stage, immediate loading
4.	Surface Design	Threaded, roughened, cylindrical	Smooth, polished surface; one-piece design
5.	Osseointegration	Relies on primary stability and osseointegration	Primarily mechanical anchorage (osseofixation) in cortex
6.	Healing Time	3–6 months before loading	Immediate functional loading within 72 hours
7.	Risk of Peri-Implantitis	Higher due to plaque retention on rough surfaces	Lower due to smooth polished surface and cortical anchorage

8.	Prosthetic Considerations	Two-piece system; screw or cement retained	One-piece system; prosthesis usually cemented
9.	Need for Bone Graft or Sinus Lift	Often required in compromised bone	Rarely required; bypasses bone defects and sinus
10.	Indications	Ideal for good bone volume and controlled cases	Ideal for severely resorbed ridges, immediate extraction sites
11.	Long-term Data	Extensive clinical data & success rates	Promising, but less long-term research
12.	Complication Management	Easier component replacement	Retrieval and revision may be difficult
13.	Cost & Lab Requirements	Generally higher (multi-stage + grafts)	Lower cost due to fewer surgeries, but specialized lab work

LIMITATIONS OF STUDY

Basal implants, while advantageous in atrophic ridges due to their graftless, flapless, and immediate loading protocol, have certain limitations.

- They are technique-sensitive, require precise cortical engagement, and offer limited prosthetic flexibility due to their one-piece design.
- Retrieval or adjustment of the prosthesis is often difficult once splinted. Compared to conventional implants, which typically require sufficient crestal bone and longer healing periods, basal implants avoid grafting and reduce treatment time.
- Unlike implant-supported overdentures, they provide fixed rehabilitation without the bulk or maintenance issues.
- Lack of long-term follow-up (only 6 months) However, long-term comparative studies are still limited, and operator expertise is crucial for success.
- Absence of CBCT-based bone density evaluation

One implant failure has been observed in anterior maxillary region i.r.t. 22.

Possible reason for Implant Failure in the Anterior Maxilla wr.t. 22

1. **Anatomical Constraints**
   The anterior maxilla presents significant anatomical challenges due to its proximity to vital structures such as the **nasopalatine canal** and **canalis sinuosus**. Accidental perforation or encroachment upon these neurovascular canals during implant osteotomy may lead to **postoperative complications**, **neurosensory disturbances**, and eventual **implant failure**.

2. **Compromised Bone Quality**
   The premaxillary region is typically composed of **thin cortical bone and low-density cancellous bone (D3–D4 type)**. This poor bone quality poses a challenge to achieving primary stability, particularly for **basal implants**, which are biomechanically dependent on engagement with **high-density basal or cortical bone**. Inadequate anchorage may lead to **micromovements**, **fibrous encapsulation**, and **early implant failure**.

3. **Surgical Inaccuracy**
   The success of basal implants is highly technique-sensitive. Improper angulation, insufficient osteotomy depth, or buccolingual malpositioning can result in **insufficient cortical engagement**, compromising the mechanical stability essential for immediate loading. Such surgical inaccuracies significantly increase the risk of **early implant failure**, especially in regions with limited bone volume.

Declaration of Patient Consent
We certify that we have obtained all appropriate patient consent forms. Patient has given herconsent for herimages and other clinical information to be reported in the journal.

The patient understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

CONCLUSION

Financial Support and Sponsorship
Nil.

Conflicts of Interest
There are no conflicts of interest.

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