Journal of Carcinogenesis
Covering Genesis to Therapeutics

Journal of Carcinogenesis, ISSN: 1477-3163
2024; Vol 23: Issue 1, https://carcinogenesis.com/

"The Rise of Mini Dental Implants: A Comprehensive Review".

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ABSTRACT

Background and objective : Mini dental implants (MDIs), a subset of reduced diameter implants (RDIs), have evolved significantly since their introduction in 1994 by Barber and Seckinger as “miniplants.” Initially intended as temporary supports for interim prostheses, these implants demonstrated unexpected osseointegration, leading to their use as permanent solutions. Subsequent innovations, such as Sendax’s 1.8 mm ultra-small implants, expanded the understanding of RDI functionality and clinical applications.This review aims to evaluate the development, clinical indications, benefits, and surface treatments associated with MDIs, along with highlighting current evidence supporting their use. Characterized by diameters less than 3 mm, MDIs offer advantages such as minimally invasive placement, immediate loading, reduced surgical trauma, and suitability for narrow ridges and edentulous mandibles.Literature supports high survival rates for MDIs, with studies reporting outcomes comparable to conventional implants, especially when used in the mandibular arch. MDIs are also favored for stabilizing removable prostheses, particularly in patients with compromised bone conditions. Surface modifications, including sandblasting, acid etching, and bioactive coatings, further enhance osseointegration and clinical longevity.Despite promising outcomes, terminology surrounding RDIs—such as "mini," "small diameter," and "narrow diameter" implants—remains inconsistent, complicating clinical communication and literature interpretation.

Conclusion :In conclusion, MDIs represent a reliable, cost-effective alternative for specific patient populations, especially those unsuitable for conventional implants due to anatomical or economic constraints. Ongoing standardization in terminology and further high-quality clinical studies are essential to refine their indications and optimize treatment outcomes.

Keywords: Mini Implants, small diameter implants, conventional implants

How to Cite: Dr Abhinandan K. Bokriya , Dr Pramod F.Waghmare, Dr Vidya Dodwad , Dr Nishita Bhosale, Dr Pranav Kulkarni , Dr Unnati Shirbhate, (2024) "The Rise of Mini Dental Implants: A Comprehensive Review".. Journal of Carcinogenesis, Vol.23, No.1, 658-667

1. INTRODUCTION

A smile goes a long way toward enhancing our natural beauty. The foundation of face esthetics is a well formed, entire smile. A complete set of teeth is required to create an attractive smile. These days, implant-borne restorations are the preferred method of treating lost teeth. Recent results indicate that surface modification of implants enables successful implant insertion in newly extracted sockets.

Typically, the extraction socket needs to mature over the course of three to four months of recovery. Patients must wait longer than six months for a tooth replacement after receiving prosthetic treatment. [1]

By concentrating on techniques like immediate or early loading after implant placement, [2] implant placement immediately after extraction , [3] and implant placement with immediate or early loading, efforts have been made to shorten the treatment duration. High success rates, ranging from 92.7% to 98%, have been reported for single-session surgery involving implant implantation in post extraction sites based on observed clinical data. [4,5]

Dental implant procedures, while effective, are not devoid of risks and complications. Compared to traditional tooth-supported prosthetics, implant treatments are typically more time-consuming, invasive, and costly. Moreover, they are associated with a higher incidence of both biological and technical issues. These factors contribute to the overall complexity and potential challenges associated with dental implants. [6,7]

2. MINI DENTAL IMPLANTS REVIEW

The literature documents the early development of reduced diameter implants. The concept of these implants was first introduced by Barber and Seckinger in 1994 as "miniplant". [8] Their implant featured a with an external connection of 2.9 mm diameter. Following this, Sendax reported on an even smaller, ultra-small one-piece implant with a diameter of 1.8 mm. [9] Initially, these ultra-small implants were intended to support interim prostheses with the expectation that they could be easily removed once no longer needed.

Contrary to this expectation, it was observed that removing such implants from bone is challenging, as these seemed to have integrated with the bone. This unexpected osseointegration indicated that even these ultra-small implants could potentially provide long-term support, similar to their larger counterparts. This observation marked a significant advancement in the understanding and poten tial applications of reduced diameter implants in dental practice. [10]

Mini dental implants (MDIs), characterized by their narrow diameter of less than 3 mm, offer several distinct advantages. According to Bidra and Almas (2013), these implants feature self-cutting threads, allowing for minimally invasive insertion through the mucosa. Typically designed as one-piece implants, MDIs come with various prosthetic attachments, such as tapered abutments or ball heads, to accommodate different dental restoration needs. [11]

One notable advantage of MDIs is their suitability for immediate loading, particularly in the mandible. Manufacturers recommend immediate loading when a primary stability of 35 N cm is achieved. Early studies indicate promising results regarding the survival rates of these implants. [12]

For patients with an edentulous mandible, inserting four to five MDIs is crucial to make sure adequate solidity of the prostheses along with the long-term desired result of the implants. This approach, as highlighted by Schwindling and Schwindling (2016), enhances the stability and longevity of dental restorations, making MDIs a viable option for many patients seeking immediate and effective dental solutions [13]

Mini dental implants have been utilized in different forms for around two decades. Their usage has steadily grown as more patients seek immediate support, contrasting with traditional endosteal root-form implants. These conventional implants require a healing and integration period without loading to ensure optimal predictability. Mini implants provide a quicker alternative, allowing for faster stabilization and support, which appeals to patients desiring prompt dental solutions. The gradual increase in the popularity of mini-implants reflects a shift towards more immediate and convenient dental care options.

Although MDIs were initially intended to be temporary and transitional, it was found that these implants seemed to osseointegrate. According to Balkin et al. [14] , the bone looked to be reasonably developed and healthy, and histologically, it seemed to be integrated to the MDI's surface at the light microscopic level. The benefits and scientific discoveries of the commercially available, ultrasmall-diameter (1.8 mm) titanium threaded implant have given clinicians a reliable and affordable way to treat loose dentures.

The terminology surrounding reduced diameter implants is somewhat ambiguous in the literature. Terms such as narrow diameter implants, small diameter implants and mini implants, are often used reciprocally, leading to confusion. Adding to the complexity, terms like provisional implants, transitional implants, and orthodontic implants are also used in varying contexts.

To clarify these terms, the Glossary of Oral and Maxillofacial Implants (GOMI) provides specific definitions:

Mini Implant: According to GOMI, a mini implant is made from the similar biocompatible materials like any other implants but is small-scale in size. These implants include an abutment designed to support or/and retain a definitive or provisional prosthesis are typically one-piece and. GOMI does not specify a diameter threshold for mini implants.

Provisional Implant: Defined as an endosseous implant with small-scale dimensional specifications and narrower widths, a provisional implant is used for a limited period. It can support a transitional prosthesis or be used immediately, temporarily, or in a transitional capacity.

Orthodontic Anchorage Implant: This type of implant is used primarily as an anchor for orthodontic tooth movement. Due to its ankylotic nature, the osseointegrated interface of the implant is exceptionally well-suited for this purpose. These implants can be either miniature or standard-sized.

Dental implants are classified based on their diameter as follows:

1. Mini Diameter Implants (MDI): These implants have a diameter of 2.7 mm or smaller.

2. Small Diameter Implants (SDI): These implants range from 3 mm to 3.3 mm in diameter.

3. Conventional Implants: These implants have a diameter exceeding 3.3 mm, up to 7 mm.

These diameter ranges are essential for determining the suitable application and placement of the implants according to the patient's specific dental requirements and anatomical features. [15,16]

Despite these definitions, the interchangeable use of terms in the literature highlights the need for standardized terminology to avoid confusion and ensure clear communication within the dental community. Understanding the precise definitions provided by GOMI can help practitioners make informed decisions regarding the selection and use of various types of implants based on their specific applications and requirements. [17]

Implant Company	Implant Nomenclature	Diameter options	Length options
3M™ ESPE, IMTEC	Classic MDI™ Implants Standard Thread Design Classic MDI™ Implants MAX Thread Design Collared MDI™ Implants Standard Thread Design Collared MDI™ Implants MAX Thread Design Hybrid Implant	1,8 mm, 2.1mm 2.4 mm 2.1mm. 1.8 mm (O-Ball Prosthetic Head) 2.4 mm 1.8 mm (Square Prosthetic Head) 2.9 mm	18, 15, 13, 10 mm
Bicon Dental	Integra-CP	3mm	8mm
Zimmer	ERA mini dental implants	3.25 mm, 2.2mm	15, 13, 10 mm
Implant Direct	GoDirect, ScrewIndirect, ScrewDirect,.	3 mm	16, 8 mm
Intra Lock	Mini Drive Lock	2mm, 2.5 mm	10, 11.5, 13, 15, 18 mm

	Long Collar Provisional MILO	2.5 mm 2mm, 2.5 mm 3mm	 13 mm 10, 11.5, 13, 15, 17mm
Hiossen		3mm , 2.5 mm	15, 13, 10 mm
Simpler Implants		2.5mm	10, 13, 15, 18 mm
KAT Implants		2.5mm, 3.0mm	10, 12, 14 mm
OCO Biomedical	1-Micro 1-Mini	2.2mm, 2.5 mm	10, 12, 14 & 16 mm
American Dental Implants		2.4 mm	16, 13, 11.5, 10 mm

TABLE 1 – COMMERCIALLY AVAILABLE IMPLANT SYSTEMS AND DIAMETERS

Overview of Surface Treatment of Mini Dental Implants

The search for tooth-coloured biomaterials to enhance avesthetics has led to the adoption of ceramics in dental implants. Ceramics offer several advantages: they are biocompatible, have high compressive strength, and can be surface-treated to improve bonding with bone. However, ceramics also have some disadvantages, such as brittleness and low tolerance to tensile stress from occlusal forces. [18]

Aluminum oxide (Al2O3) and zirconia (ZrO2) are two ceramics that demonstrate high biostability, making them suitable for implant use. Aluminum oxide is known for its superior surface wettability, which can enhance initial bone bonding. On the other hand, zirconia has the benefit of reduced plaque accumulation, contributing to better oral hygiene and long-term success of the implant. [18]

Bioglass (composed of SiO2, CaO, Na2O, P2O5, and MgO), which is a specific type of bioactive ceramic is particularly notable for its ability to stimulate bone formation, thus enhancing the integration of the implant with the bone. [18]

Despite its initial use in dental implants, aluminum oxide (Al2O3) has been retired from the market because of its poor survival rate. Zirconia, however, has emerged as the material of choice, especially in scenarios involving high occlusal forces. Its combination of aesthetic qualities, biocompatibility, and mechanical properties make zirconia a distinctive and preferred option in modern dental implantology. [18]

Most commonly preferred material for dental implants is Titanium because of its numerous advantageous properties. It boasts exceptional biomechanical strength, a high strength-to-weight ratio, and remarkable resistance to corrosion. Specifically, the tensile strength of titanium alloys is comparable to that of multiple other materials, including super-alloys which are iron-based. However, titanium alloys have the added advantage of being significantly lighter than these materials. This combination of high strength and low weight makes titanium alloys an ideal choice for applications where both durability and reduced mass are critical. Additionally, their lightweight nature contributes to less strain and improved comfort in dental implants, enhancing patient satisfaction. [19,20]

The quality & speed of osseointegration are closely linked to the surface properties of implants, such as topography, texture, roughness, wettability, chemical composition & surface electrical tension. Enhancing the integration of osteoblasts with a titanium surface can be achieved through modifications in surface topography and morphology. Surface treatments are generally categorized into subtractive & additive methods.

Subtractive methods involve plastically deforming the surface & removing material particles to alter its roughness. Surface treatments can also be classified based on the type of modification: mechanical, chemical, and physical, although these categories often overlap.

Additive methods are of two types. In the first type, materials are applied to the surface while not forming chemical bonds. This includes techniques like hydroxyapatite coatings, plasma spraying, aluminum coatings, and calcium phosphate (CaP) coatings. The second type involves impregnating substances into the implant material, forming chemical bonds. Examples include incorporating fluoride ions into the titanium surface or impregnating the titanium oxide (TiO2) layer with calcium phosphate crystals.

Machining, grinding, polishing, and blasting are examples of mechanical treatments. In addition to roughening the surface, chemical processes including anodization, surface deposition via chemical bonding, and etching with acids or alkali change

the chemical makeup of the implant and impact its wettability. Physical techniques include ion deposition, laser surface treatment, thermal spraying, and plasma spraying.

A different approach for creating a surface which is biologically active is through physicochemical and biochemical deposition methods, which add another layer to the implant surface, enhancing its integration with the surrounding bone. [21, 22]

A machined titanium dental implant which is not surface treated typically has a smooth surface. However, research indicates that titanium implants with rough surfaces achieve better osseointegration, both in quality and speed, compared to those with smooth surfaces[23,24] The main goal of these methods is to roughen the originally smooth surface of titanium implants. This enhancement is intended to increase cell adhesion to the implant and boost cell metabolic activity.

Proper modification of implants should enhance bone-implant attachment and increase mechanical resistance post-implantation. Numerous studies have shown that optimizing dental and orthopedic implants can be achieved through chemical or topographical surface modifications. Techniques such as blasting, hydroxyapatite deposition via plasma, sandblasting, etching, and anodizing have all been demonstrated to improve implant performance. [25]

While all of the techniques enhance the osseointegration of implants to some extent, they also have limitations that can negatively affect the long-term durability of the implant in the bone. Jemat et al. (2015), mentioned plasma spray coating is among the most commonly used treatments, accounting for approximately 40% of applications. Other common treatments include acid etching, sandblasting, and combinations of these methods, such as SLA surfaces. Less frequently used techniques include ion implantation, laser treatment, and magnetron sputtering. The principles and applications of these primary methods in implantology are detailed in the following paragraphs. [26]

Implant Company	Implant Name	Surface treatment
3M™ ESPE, IMTEC	Classic MDI™ Implants Standard Thread Design Classic MDI™ Implants MAX Thread Design Collared MDI™ Implants Standard Thread Design Collared MDI™ Implants MAX Thread Design Hybrid Implant	Sandblasted and acid etched
Bicon Dental	Integra-CP	Hydroxyapetite coated (HA) and acid etched
Zimmer	ERA mini dental implants	Tapering screw (acid etched)
Implant Direct	GoDirect, ScrewIndirect, ScrewDirect.	Sandblasted with hydroxyapatite particle and acid washed: Soluble blast media (SHM)
Intra Lock	Mini Drive Lock	OSSEAN: Enhancing bioactivity with a new calcium phosphate-molecular impregnated implant surface NON-OSSEAN

	Long Collar Provisional MILO	No information
Hiossen		Resorbable blast media
Simpler Implants		Hydroxyapetite (HA) nd grit blasted, acid etched
KAT Implants		Aluminium oxide blasted
OCO Biomedical	1-Micro 1-Mini	Machined, textured and acid-etched
American Dental Implants		Micro porous texture, Hydroxyapetite (HA) coated

TABLE 2 – COMMERCIALLY AVALABLE IMPLANT SYSTEMS AND THEIR SURFACE TREATMENTS

Overview of the Surgical Protocol for Mini Dental Implants

TWO STAGE SURGICAL PROTOCOL [27]

STAGE 1

Flap Preparation and Reflection

The pre-surgery preparation for mandibular implant placement begins with a lingual-crestal incision followed by the reflection of a mucoperiosteal flap to expose the alveolar ridge. This meticulous approach ensures clear visibility and accessibility to the implant site, facilitating precise and controlled surgical maneuvers.

Initial Drill

First, the initial drilling stage utilizes a Hall drill equipped with a #8 round bur, with thorough irrigation. This step involves the creation of 0.5-mm starter holes in the bone, which serve as the initial guide for implant placement.

Secondary Drill

Subsequently, a secondary drilling procedure employs a standard MDI titanium drill with a diameter of 1.1 mm to establish a hole through the superior cortical plate. This precise drilling process ensures that the implant site is thoroughly prepared to accommodate the mini dental implants.

Implant Placement

The implant insertion process is executed with great precision. Initially, the implants are positioned in the specified tooth locations using a handheld finger driver. Subsequently, a ratchet is utilized to properly seat the implants. Successful insertion is confirmed when adequate resistance is reached at around 40 Ncm, ensuring that the implants are firmly anchored in the bone. This meticulous approach is essential for guaranteeing the implants' stability and durability.

Graft Placement

The next step involves grafting the areas around positions of the implants to further support the regenerative process, this membrane-guided regeneration technique enhances bone healing and integration, providing a robust foundation for the implants.

Suturing

Once the implant is securely positioned, the flaps are repositioned and sutured to facilitate healing and protect the surgical site.

STAGE 2

Following a four-month healing period, a second-stage surgery is performed.

Anesthesia and Flap Reflection

Local anesthesia is administered to ensure patient comfort, and an incision is made on the ridge crests. Mucoperiosteal

flaps are reflected to expose the healing plugs. At this stage, all implants are assessed and found to be embedded in healthy bone, firm, and with no mobility, indicating successful osseointegration.

Prosthetic phase

The healing plugs of the implants are replaced with prosthetic-type abutments, which are critical for the final prosthetic restoration. The flaps are carefully approximated and sutured to promote optimal healing.

Finally, a new prosthesis is fabricated using auto-curing acrylic and cemented in place. This step ensures that the patient has a functional and aesthetically pleasing dental restoration. This comprehensive surgical protocol highlights the importance of meticulous planning, precise surgical techniques, and careful post-operative management in achieving successful outcomes for mandibular implant placement.

3. SINGLE STAGE SURGICAL PROTOCOL

Administration of Anaesthesia

Administer local anaesthesia alone or in combination with intravenous sedation, depending on the patient's needs and procedure complexity. Ensure effective anaesthesia to minimize patient discomfort and facilitate a smooth surgical process.

Creating Gingival Access Points:

Use either an electrocautery scalpel or a laser to make precise 2-mm diameter access points through the gingiva down to the bone along the alveolar crest. This minimally invasive approach aims to prepare the surgical site with minimal trauma to surrounding tissues.

Drilling:

Perform initial drilling using a Hall drill with a #8 round bur under copious irrigation. Create 0.5-mm starter holes in the bone, serving as the preliminary guide for implant placement. Conduct secondary drilling using a standard MDI 1.1-mm diameter titanium drill. Create a hole through the superior cortical plate, ensuring the implant site is adequately prepared for the mini dental implants.

Implant Insertion:

Position the implants in the designated tooth locations using a handheld finger driver. Use a ratchet to properly seat the implants. Confirm successful insertion when adequate resistance is reached at approximately 40 Ncm, ensuring the implants are firmly anchored in the bone.

Immediate Loading:

Immediately load the implants to provide prompt functionality and support. Facilitate effective integration of the implants with the surrounding bone and tissues, allowing for the immediate usability of the prosthetic components.

Prosthetic phase for Mini Dental Implant

Mini implants are designed as a single, integrated piece, meaning they do not have separate abutments like traditional implants. This design eliminates the concern of a micro-gap, which is a little space that can occur inbetween the implant and abutment in multi-piece systems. A micro-gap can lead to bacterial infiltration and peri-implant inflammation, but since mini implants lack this junction, they avoid this potential complication.

The upper part of the mini implant, known as the coronal portion, also serves as the abutment. This portion can be adjusted or prepared to ensure it is parallel with other implants or teeth, which is crucial for creating a stable and even fit for a prosthesis. A conventional crown and bridge impression technique can be used with mini implants, which involves taking a precise mold of the dental structures to ensure accurate fitting of the prosthetic.

Removable prosthesis over mini dental implants

Mini implants can serve the purpose to support removable dentures in both the upper (maxillary) and lower (mandibular) jaws. For optimal long-term success, it is important that the bone supporting these implants is of high quality, classified as Misch type I or II. These bone types are typically found in atrophic or severely resorbed areas of the jaw, which are common in patients who have been edentulous for a long time. [28,29,30]

In cases where patients have atrophic edentulism, mini implants offer an effective and immediate solution. The success of immediately loading these implants—meaning placing a prosthesis on them right after implantation—largely depends on achieving good primary stability. This stability is crucial for the proper retention of removable dentures, ensuring that they remain secure and functional even in areas where bone density is compromised.

Overall, mini implants provide a minimally invasive option for patients who might not be candidates for traditional implants due to insufficient bone volume or quality, especially in atrophic cases. [31,32]

Implants can be loaded right away to hold an overdenture in place when they are inserted into denser bone types with an insertion torque of at least 30 Ncm. The patient has a sturdy, working denture right away when the treatment is finished. When compared to normal implant treatment, this procedure might be quick and affordable. [33]

Fixed prosthesis over mini dental implants

In cases where there is significant bone loss or reduced bone length, mini implants can sometimes be used to support fixed restorations for select patients. However, this approach comes with several considerations and challenges, particularly in the esthetic zone, which is the area of the mouth visible when a person smiles or talks. The esthetic zone is subjective and varies according to the patient's perception of their appearance. [30]

Patients often have high expectations regarding the appearance of their dental restorations, and some might find smaller prosthetic crowns, which are sometimes necessary due to limited space or bone availability, to be unacceptable. This can make managing patient expectations a crucial aspect of the treatment plan.

Immediate loading of mini implants—where a restoration is placed on the implants right after they are inserted—might not be suitable for fixed prostheses. Unlike removable dentures, fixed restorations exert more substantial forces, particularly off-axis (not aligned with the long axis of the implant). These forces can cause micromovements, which might prevent the implant from properly integrating with the bone or cause it to lose integration over time.

Therefore, clinical caution is advised when using mini implants for fixed restorations, especially in cases of osseous atrophy. It's essential that the bone quality is classified as Misch type I or II, which means it is dense enough to support the implants effectively. Additionally, an occlusal scheme should be designed to evenly distribute biting forces across the prosthesis or use an implant-protective occlusal scheme to minimize stress on the implants. [29]

It's important to note that there is limited published evidence supporting how mini implants are used for fixed complete or partial dentures in upper jaw (maxilla). This lack of evidence highlights the need for careful patient selection and thorough clinical evaluation when considering mini implants for fixed restorations in areas with bone loss. [28,29,30]

While at least 6 implants are typically required to securely retain a complete removable denture in the upper jaw (maxilla), supporting a fixed complete maxillary prosthesis often necessitates the placement of 10 to 12 implants, especially when the implants are splinted together for added stability. [28,29,30]

When implants are splinted together, meaning they are connected or linked as a unit, the forces from chewing (masticatory forces) and biting (occlusal forces) are spread out over several implants instead of being concentrated on just one. This distribution helps reduce the stress and load placed on any individual implant. By increasing the number of implants that share the load, the pressure exerted on the supporting bone is also spread across a larger area. This broader distribution of forces can enhance the overall stability of the prosthesis and reduce the risk of implant failure due to overloading any single implant or area of bone. [30]

The success of mini implant treatment depends on several critical factors:

Anatomic Locations: The placement of mini implants must take into account the specific anatomical features of the patient's mouth. This includes avoiding areas with inadequate bone support or proximity to important anatomical structures like nerves or sinuses. Proper positioning ensures that the implants have sufficient bone for stability and integration.

Bone Quality: The quality of the supporting bone is a crucial factor in determining the success of mini implants. Ideally, the bone should be dense and strong enough to provide a stable foundation for the implants. Bone classified as Misch type I or II, which denotes higher density, is typically preferred for mini implants to ensure proper osseointegration and long-term stability.

Esthetic Considerations: In areas of the mouth that are visible when a patient smiles or speaks, esthetic outcomes are particularly important. The placement of mini implants must be planned carefully to achieve a natural appearance, taking into account the size and position of the prosthetic teeth. This involves managing patient expectations and ensuring that the final result meets their esthetic needs.

Protective Occlusal Schemes: A well-designed occlusal scheme is essential for distributing the forces of chewing evenly across the implants and the prosthesis. By ensuring that the bite forces are evenly distributed, the risk of overloading any single implant is minimized, which helps prevent implant failure and prolongs the life of the restoration. In some cases, an implant-protective occlusal scheme may be used, which specifically aims to reduce stress on the implants. [33]

Limitation of mini implant treatment

Despite their growing popularity and advantages, mini dental implants (MDIs) come with certain limitations that must be carefully considered during treatment planning.[34] One of the primary concerns is their **reduced mechanical strength** due to smaller diameters, which makes them more susceptible to **fracture under excessive occlusal forces**, especially in posterior regions where bite loads are higher. Additionally, MDIs offer **less surface area for osseointegration**, which can potentially compromise long-term stability in areas of low bone density.[35] Their **one-piece design** also limits prosthetic

flexibility and may pose challenges during prosthetic adjustments or if a component fails. Immediate loading, while convenient, increases the risk of **micromovement and failure** if primary stability is not adequately achieved. [36] In esthetically demanding areas, the limited prosthetic space and reduced diameter may lead to **suboptimal crown proportions**, impacting patient satisfaction. Furthermore, clinical evidence on the long-term success of MDIs, especially for **fixed prostheses**, remains limited compared to conventional implants. Proper case selection, occlusal management, and patient education are essential to mitigate these limitations and ensure predictable outcomes.[37-38]

4. CONCLUSION

The choice of implant size should be tailored to the patient's specific anatomical and functional needs, balancing the benefits of stability and load distribution with the constraints of bone availability and quality. Small-diameter and mini dental implants provide a practical solution for patients with narrow alveolar ridges or other anatomical challenges, offering a less invasive approach that can reduce surgical risks and shorten treatment time. By carefully considering these factors, clinicians can optimize the success rates of dental implants and ensure the best possible outcomes for their patients.

Mini dental implants can be a suitable option for both retaining removable prostheses and supporting fixed complete or partial dentures. Their versatility makes them a valuable choice for a range of dental restorations, especially in patients who might not be ideal candidates for traditional implants due to bone density or anatomical limitations.

While there is still limited high-level evidence, several low-level studies, including case reports and small cohort studies, have demonstrated the, predictability, relative effectiveness & feasibility of mini implants for supporting both removable and fixed dental prostheses. These studies suggest that with careful patient selection and treatment planning, mini implants can be a reliable solution, providing satisfactory outcomes for patients who might not otherwise be candidates for conventional implants. However, ongoing research and more extensive clinical trials are needed to further validate these findings and establish standardized protocols for their use.

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