Dental, Mini-Implants

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Publication Details

Introduction

Since ancient times, it has been a challenge to come up with the best way to replace missing teeth. Previously, dentures were the standard way of replacing lost teeth. Science, technology, and researchers have provided choices for better care of teeth and understanding of oral health, leading to solutions for most oral problems. Osseointegration has become the focus of modern implantology, leading to the introduction and refinement of the osseointegrated root form implant. Available implants vary in diameter from 1.8 mm to 7 mm. The mini implant is a dental implant that is fabricated with a reduced diameter (less than 3 mm) and a shorter length but with the same biocompatible material as compared with standard dental implants. Mini implants present a reduced diameter (less than 3 mm), while narrow/conventional diameter implants typically have a diameter greater than 3 mm. Therefore, the use of mini implants to retain overdentures enables the use of less-complex surgical techniques since the reduced diameter of the implant permits its placement in areas with low bone thickness. These implants are associated with high survival rates, favorable marginal bone loss, and increased satisfaction and quality of life of patients. The quantity and quality of bone tissue available in the jaw typically define the characteristics (diameter and length) and the number of implants. Overdentures retained by conventional implants exhibit good long-term results, but also present some limitations such as cost, difficulty with placing the implant in reduced buccolingual dimensions of bone without the need for bone-grafting procedures, and the presence of chronic systemic diseases that can prevent most advanced surgeries such as bone grafts and lateralization of the inferior alveolar nerve. Concomitantly, sometimes it is not necessary to open flaps, decreasing morbidity during the postoperative period. These aspects are some of the attractive factors that increase patient acceptance of mini implant treatments.

Anatomy

Mini dental implants can be compared to conventional implant systems. They are made of one piece; however, conventional implants usually consist of two parts, the implant and the abutment. Mini implants have a one-piece titanium screw with a ball-shaped head for denture stabilization or a square prosthetic head for fixed applications, instead of the classic abutment. Mini implants are protruded over the gum surface when they are placed into the bone; conventional implants are placed under the gums.

Indications

Mini implants should be considered for retaining overdenture prosthesis as an alternative treatment when standard implant placement is not possible. Mini implants may be considered for the rehabilitation of patients who express dissatisfaction with conventional dentures and have limitations regarding the placement of standard implants. They are indicated for replacement of the teeth in a narrow ridge. Multiple implants can be used for removable full or partial denture stabilization, and are offered at a lower cost. These can be acceptable for patients with limited economic capabilities. Mini implants in the edentulous or partially edentulous arch are indicated when the facial-lingual width of the bone is insufficient for the placement of a traditional width implant. Mini implants are also used in the anterior maxilla because of decreased palato-labial bone width and/or insufficient interdental space. In the atrophic posterior mandible, insufficient buccolingual bone width is the common indication for mini-implant placement.

Contraindications

Mini implants should be avoided for patients who are medically unfit for the treatment. Prospective patients must be thoroughly evaluated for all known risk factors and conditions related to oral surgical procedures and subsequent healing before any clinical treatment. Contraindications include but are not limited to the following:

- Vascular conditions
- Uncontrolled diabetes
- Clotting disorders
- Anticoagulant therapy
- Metabolic bone disease
- Chemotherapy or radiation therapy
- Chronic periodontal inflammation
- Insufficient soft tissue coverage
- Metabolic or systemic disorders associated with wound and/or bone healing
- Use of pharmaceuticals that inhibit or alter natural bone remodeling
- Disorders inhibiting patient ability to maintain adequate daily oral hygiene
- Uncontrolled parafunctional habits
- Insufficient bone height and/or width
- Insufficient interarch space (not always placed in the narrow alveolar ridge)

In edentulous arches, more than two implants are usually needed due to narrow the diameter, the unpredictability of survival, and the lack of scientific understanding. Treatment of children is not recommended until growth is finished and epiphyseal closure has been completed.

Technique

Preoperative planning includes a maximum of diagnostic information. A panoramic x-ray is a minimum requirement, a Cone Beam CT scan is recommended for 3D planning especially in cases with very narrow ridges. Raising a flap or flapless; If there is sufficient width of the ridge a flapless transgingival technique for the pilot drill is possible. When however a narrow ridge of extensive soft tissue is present a minimal flap (crestal incision) is recommended to reveal the bone. This would allow exact placement of the implants at the correct angulation in the bone. The mini dental implant system utilizes a self-tapping threaded screw design and employs minimally invasive surgical intervention. Implant placement involves the following procedure: The left and right mental foramen are marked with an intra-oral skin marker. The ridge is marked 7 mm anterior of the mental foramen to indicate the most distal implant size. This safety zone includes a potentially present 3 to 5 mm anterior loop and a 2 mm security margin.

Complications

The primary disadvantages of mini implants for definitive prosthodontic treatment are as follows:

1. The need for multiple implants because of the unpredictability and lack of current scientific guidelines and understanding
2. The limited scientific evidence about long-term survival
3. The potential for fracture of the implant during placement
4. Lack of parallelism between implants is less forgiving because of the one-piece design
5. The reduction in resistance to occlusal loading, similar to narrow diameter implants
6. Other disadvantages attributable to flapless surgery (when used) such as lack of bone visibility, inability to irrigate the bone, and contraindications in situations requiring alveoloplasty to gain prosthetic space

Clinical Significance

Despite these disadvantages, the need for mini implants will continue to grow, especially among edentulous patients because of the following:

1. An increase in the need for complete dentures
2. The increased cost of standard implants
3. Access-to-care issues, especially among economically disadvantaged patients and patients indicated for maxillofacial prostheses
4. Medically compromised patients who may not be candidates for traditional surgical procedures or ridge augmentation procedures
5. Increased interest in implant dentistry among general dentists

Therefore, the current evidence must be reviewed and synthesized with the available clinical data on the survival of mini implants for definitive prosthodontic treatment.

Questions

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