

Research Article

## Endodontic Stabilizers: A Myth

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### ABSTRACT

Endodontic implants or stabilizers are metallic extension of the tooth root into the bone. With increase in the scope of implantology in dentistry, the endodontic implants help provide a conservative treatment method to retain a natural teeth rather than replacing it. These endodontic implants are inserted through the previously prepared canals of the tooth into the osseous portion of the periodontium just like a conventional implant. They are indicated mostly in severely mobile teeth in an aim to retain the natural teeth rather than extracting and replacing it with an endosseous implant. These endodontic implants, even though having very good success in some cases had encountered failure due to many factors which made the practitioners not to consider them as a primary mode of treatment. This article tends to assess the success and failure of endodontic implants by reviewing various case reports and studies presented over the time.

**Keywords:** Endodontic, Stabilizers, Implants

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### INTRODUCTION

The idea of retaining patient's natural teeth in case of advanced periodontal disease in combination with dental caries is becoming more and more common among all dental practitioners around the world. The endodontic stabilizers provide a different dimension towards this idea. It has been around for a long time in which the dentist is able to use an endodontic implant, which can be placed intra osseous through the prepared canal walls. These implants are primarily indicated to stabilize severely mobile tooth with endodontic periodontic lesions. They are also indicated to retain the tooth which had suffered trauma<sup>1, 2</sup>. This review tries to critically analyse the use of endodontic stabilizers in day to day practise and also uses various case presentations from around the world to determine the longevity of the treatment modality.

### ENDODONTIC STABILIZERS

Endodontic implants were first proposed in 1943 by Bernier, in order to increase the root length in teeth with short roots and mainly to stabilize teeth affected with periodontal disease and prolong the longevity of these teeth<sup>3,4</sup>. These implants can in some cases provide a sound physiologic procedure in stabilising the teeth by altering crown root ratios, increasing root length, immobilising fractured roots, periodontally compromised teeth and restraining its function<sup>1,2,4</sup>. This is considered as one of the oldest conservative treatment method in endodontics before the introduction of pre-fabricated and cast posts used now a days. The dilemma among clinicians is whether to accept this treatment method or not to accept it. Many studies and case presentations over years right from the

date of introduction of endodontic implants have very minimum positive results to argue their cause.

These implants are available in various types like, initially they were available as Vitallium (cobalt chromium-molybdenum) considered to be inert and bio compatible to the periodontium by various clinicians<sup>3,5,6</sup>. But were later concluded as, less biocompatible as their corrosion in the peri apical tissue caused reversible inflammatory response which was demonstrated by F. Goldberg in his histological study. So, these Vitallium implants were gradually replaced by the most bio compatible pure titanium alloys which are the major component of implants in dentistry<sup>4, 6, 7</sup>. Apart for these commercially available endodontic implants, various other methods like using a stainless K file or even a Nickel Titanium (NiTi) file as an endodontic implant have been clinically tried and tested and proved to yield encouraging results in some cases<sup>8</sup>.

Historically the design of an endodontic implant was provided and patented few decades ago in the United States. They were initially designed as a threaded, self-tapping endodontic stabilizer for insertion into the jawbone of a patient's mouth through an aperture in a loose tooth to stabilize the tooth comprises an elongated penetrating member having adjacent its coronal end a head adapted for manual rotation and adjacent its apical end a threaded shaft defining a plurality of lands and grooves. Two types of endodontic stabilizers were earlier used in clinical practice, they are smooth, tapered stabilizers and threaded, self-tapping stabilizers. With smooth, tapered stabilizers, formation of the apical seal is dependent upon effective wedging of the cemented implant at the apex, resistance to implant withdrawal from the tooth is dependent upon the

shearing properties of the dental cement employed and stabilizer retention within the jawbone is dependent upon the formation of collagenous perio stabilizer ligament about the stabilizer. The efficacy of an endodontic stabilizer depends essentially upon three considerations<sup>9</sup>.

- The stabilizer should form an effective apical seal (that is, the seal between the stabilizer and the base of the tooth defining the aperture).
- The stabilizer must be effectively retained within the tooth to fix the tooth relative to the stabilizer.
- The stabilizer must be effectively retained within the jawbone beyond the apex to fix the stabilizer relative to the jawbone.

#### ENDODONTIC IMPLANT SUCCESS OR FAILURE

Endodontic stabilizers are most positively indicated for tooth which had undergone a horizontal root fracture or it there is an advanced periodontal disease associated with the tooth. In horizontal root fracture the coronal third and apical third fractures have good prognosis, whereas the mid-root fractures poses a dilemma to the treating endodontist. Usually mid-root fractures are displaced or angular fractures, which are difficult to align via conventional root canal therapy. Even if a dentist is able to align them, they usually have a poor prognosis the most common treatment alternative to mid-root fractures, is the extraction of the apical fragment. However, this treatment compromises the crown–root ratio<sup>10</sup>. To compensate for the reduced crown–root ratio, the use of endodontic stabilizers has been attempted by Frank<sup>11</sup>. The endodontic stabilizer increases the root anchorage in the bone by the extension of the artificial material beyond the limit of the alveolar socket within the limits of the alveolar bone and thus helps in stabilizing the teeth with compromised alveolar support.

The success or failure of these endodontic implants mainly depends on following factors.

#### Composition

Initially the composition of endodontic implants included Vitallium; this alloy is composed of 65% cobalt, 30% chromium, and 5% molybdenum. Their non-electrolytic and inert properties were verified by Bernier and Canby in 1943. But during the course of time these alloys developed corrosion which decreased their bio compatibility and tissue tolerance and resulted in moving on to a more biocompatible metal like titanium used in conventional implants or even Nickel-Titanium (NiTi) alloys for manufacturing these implants<sup>12</sup>.

#### Design

The designs of these implants were patented decades ago in the United States<sup>9</sup> and their morphology has evolved just like the design of the conventional endosseous implants which resemble the root structure as close as possible so that the crown root ratio of the tooth is maintained. This holds true for the endodontic implants as well because retaining a tooth with fractured apical third would dictate to maintain the crown root ratio to ensure the survival of the tooth.

#### Clinician's skill

The skill of the clinician, just like every procedure in endodontics would play a vital role. It may be very important from as early as diagnosing the state of the affected tooth to the proper preparation of the canal walls for placement of these implants and also the selection of the appropriate implant to be placed which is of utmost importance.

#### Proper case selection

Case selection would also come under the clinicians skill, but as the success or failure of the endodontic implants depend on this, it is considered as a separate entity. Selecting a case ideal for endodontic implants or vice versa is a prime factor in determining the prognosis of the treatment. Selecting a patient who doesn't require placement of an endodontic implant would finally result in as very severe complication and it is same for the other way around. According to Weine<sup>13</sup>, among the fifty or more implants that he placed 15–22 years ago for periodontal reasons, only one still remains functional. This fact alone stresses one of the most importance of case selection. It requires that critical information be gathered and evaluated for each case in order to determine whether endodontic implants are the best solution.

#### Adequate follow up

Regular follow up of the patients with endodontic implants with proper radiographic examination of the treated site would help indicate the success or failure of the treatment. The question whether endodontic stabilizers are a success or a failure is the most commonly positive and negative results which doesn't help in solving the practitioners dilemma. Here are some case reports presented over the past few years which may help in analysing the success and failure of endodontic implants.

The successful result of the endodontic endosseous stabilizer which was placed in conjunction with surgical intervention. A 18 mm implant was selected and coated with luting type 1 Glass Ionomer cement for the cementation of the implant. The implant was then inserted through the root canal into the periapical osseous defect to lengthen the existing root. The patient was followed up after 1 month, 6 months, 1 year and 3 years. The results showed excellent bone formation around the endodontic stabilizer<sup>10</sup>.

In another case report, a 26 year old man reported with mobility and discolouration of maxillary front tooth. A no. 90 K file was used to prepare a 5 mm canal apically into the bone and then a no.100 K file was threaded into the prepared channel. Review after 1 week and followed every month and after 6 months follow up appreciable bone formation was seen and the mobility the teeth had disappeared. An endodontic file was used in this case as a stabilizer because of easy availability, cost effective and the files are biocompatible<sup>8</sup>.

In a case report, with a crown fracture in both his maxillary central incisors and some degree of tooth mobility which were the result of a past accident. On a periapical radiograph, a horizontal root fracture at mid root in his left maxillary central incisor and also root resorption in the apical portion of his right maxillary central incisor were observed. Later rigid maxillary fixation followed by

endodontic therapies were used to obturate the coronal portion and the apical portion was stabilised using a chrome-cobalt pin was designed so that 7–12 mm of its length would be placed in osseous tissue and 5–7 mm in the root canal. Two months after surgery mobility of the tooth was significantly decreased. The repair of osseous tissue, however, needed more time <sup>14</sup>.

In a case report, a male Patient, 25 years old presented with mobility in his mandibular front tooth. On radiographic examination apical rarefaction was observed. Then it was decided to perform endodontic implants to stabilize these teeth and create the conditions for a future prosthetic restoration. The canal preparation was done with rotary instruments and then the implant was cemented with Apexit sealer preventing excessive contact of cement with the tip of the implant that would have contact with the alveolar bone. After 16 months, clinical evaluation showed normal periodontal limits, absence of tooth mobility and periodontal disease. Radiographic bone repair was observed in the apex, the apical radiolucency suggests a limited apical healing and biocompatibility of the implant with bone tissue <sup>15</sup>.

A study conducted by Fragiskos et al where a new endodontic stabilizer implant device was presented that can be used immediately after enucleation of large periapical cysts. The force transmission characteristics of this implant were evaluated by means of photo elasticity. The implant served to distribute incisal forces within the supporting structure. Improved stress conditions resulted at the tooth apex and between the apex and the superior border of the implant when the tooth was subjected to apicosectomy <sup>16</sup>.

In a case report where two cases were presented with 5-yr follow-ups in which Vitallium endodontic implants were used successfully to improve the crown-root ratio of central incisors compromised by trauma. A review of recent developments in endodontic implant materials and designs indicates that new materials should provide greater biocompatibility and retention <sup>17</sup>.

In a study done by Parmar et al used custom fabricated implants to stabilize teeth that have lost a good portion of alveolar support. Two hopeless cases were restored to function with ceramic-coated, custom-fabricated chrome-cobalt implants <sup>18</sup>.

In a case report regarding the treatment of middle third root fracture by Kedar Samant et al, these fractures have long been considered hopeless. Since removal of the apical segment creates an undesirable crown-root ratio, whereas too little is left to support a post, core and jacket crown, if the coronal portion is removed. These case reports suggested two modes of treatment of mid-root fractures: a. Non-surgical endodontic stabilizer for cases where root canal of the fractured apical fragment can be negotiated through the routine coronal access opening. b. Surgical endodontic stabilizer for cases where: 1. Severe displacement of the fractured fragments has occurred. 2. The root has fractured into many splinters. 3. Surgery is mandatory to retain the tooth.

In a study done by Osvaldo Zmener, One successful and two unsuccessful Vitallium endodontic stabilizers were

studied using the scanning electron microscope and the electron microprobe. All implants showed numerous dark-pitted and cratered areas which represented surface corrosion. The electron microprobe analysis of the same areas showed that important quantities of the elements constituting the alloy were loosed whereas some concentration of calcium, phosphorous, sulphur, and chlorine were detected on implant surfaces. Chromium and cobalt were also detected on small portions of a fibrous-like tissue which was removed in conjunction with one of the implants. Our findings suggest that corrosion could be an important factor to consider when evaluating the long-range results with the use of an endodontic implant.

## CONCLUSION

In spite of its conservative approach to treatment, the endodontic stabilizers are rarely used in day to day clinical practise as they have a very controversial success rate. This creates a dilemma for clinicians to follow this treatment modality. But by reviewing several case reports and studies it can be concluded that endodontic implants can be a success if they are manufactured from bio compatible materials, used with proper technique and important of all used for cases which are selected based on clinical and radio graphical evidence.

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