CASE REPORT

ENDODONTIC STABILIZATION USING IMPLANTS WITH AN IMPROVED DESIGN - A REPORT OF 2 CASES

Authors:
Meera Gopalakrishnan[1],
Prasanth PS [2],
Raison Sujai[3],
Mohan B[4]

[1]Reader,
Dept. of Conservative Dentistry and Endodontics,
Indira Gandhi institute of Dental sciences,
Nellikuzhy P. O., Kothamangalam 686 691,
Kerala, India.

[2]Reader,
Dept. of Orthodontics,
Indira Gandhi Institute of Dental sciences,
Nellikuzhy P. O., Kothamangalam 686 691,
Kerala, India.

[3]Private Practitioner.
[4]Professor and Head,
Department of Conservative Dentistry and Endodontics,
SRM Kattankulathur Dental College,
SRM University , Kattankulathur,
Kancheepuram Dt.

Address for correspondence:
Dr. Meera Gopalakrishnan,
Reader,
Dept. of Conservative Dentistry and Endodontics,
Indira Gandhi institute of Dental sciences,
Nellikuzhy P. O., Kothamangalam 686 691,
Kerala, India.
E mail: meeragkrish@gmail.com.

ABSTRACT

Endodontic endosseous implants are metallic extensions of the tooth root which extends beyond the root apex and is inserted into a prepared channel in the bone. They have been used in the past for stabilization of teeth with compromised crown root ratio to improve their prognosis. The inability of these implants to obtain an adequate coronal seal and lack of osseointegration have been cited as the cause of their varying amount of success. The improvement of the implant design and the material used for its fabrication is believed to overcome these drawbacks. This article reports two cases in which endodontic implants with a new design and a predictable technique are used to stabilize teeth with compromised crown root ratio.

Key words: Endodontic endosseous implants, osseointegration, endodontic stabilization.

J Odontol Res 2013;1(1):93-8.

INTRODUCTION

Preservation and maintenance of natural tooth is a prime consideration in modern dentistry. Extraction and subsequent replacement should only be considered after all other means of retaining the natural tooth has been fully explored [1]. A tooth with an unfavorable crown root ratio is a situation with a guarded prognosis in which a successful endodontic therapy alone is insufficient in maintaining the tooth in the arch in its physiologic and functional integrity. Teeth with an unfavorable crown root ratio due to root resorption or horizontal root fracture are a few of the major indications for the placement of an endodontic endosseous implant [2].

Endodontic implants are metallic extensions of the tooth root which extends beyond the root apex and is inserted into the previously prepared channel in the bone [3]. The objective of placement of the endodontic implant is to increase the support for the tooth by passing it beyond the confines of the root canal into the periapical bone, thus improving the crown root length ratio and stabilizing the tooth. Endodontic endosseous implants were first reported by Strock and Strock in 1943[4]. During the last 50 years many clinicians have used stabilizers as an adjunct to dental treatment. The endodontic endosseous implant avoided the greatest site of routine implant failure – epithelial down growth along the supracrestal portion of the fixture. This problem was avoided by placing the endodontic endosseous implant directly through the canal of the tooth into the periapical tissues as an extension of the already present root length [5].

This article presents two case reports in which endodontic stabilization has been done in two teeth with impaired crown root ratio using an endodontic endosseous implant with an improved design.

Case Report 1

A 24 year old male patient was referred to the Department of Conservative Dentistry and Endodontics, from the Department of Orthodontics after the completion of a 3 year long orthodontic treatment.

The medical condition of the patient was essentially negative. The right maxillary central incisor 11 was found missing. The intra oral peri apical radiographs made at the initial visit revealed apical root resorption in the left maxillary central incisor 21. The root structure was resorbed to a level that only 7-8mm of the root was found within the bone (Fig 1). 21 tested non vital on electrical and thermal pulp testing (heated gutta percha) and the tooth exhibited Grade I mobility. The gingival status and the periodontal probing depth was found to be within normal limits for 21.

After a detailed discussion with the orthodontist and the patient the following treatment plan was agreed upon. Initiation of the endodontic treatment, stabilization of the tooth using an improved design endodontic implant and restoration of the missing adjacent tooth with a fixed partial denture using the stabilized tooth as an abutment.

The procedure was undertaken in two appointments. The armamentarium (Figure 2) included stainless steel K-files till ISO size 120(Mani Inc, Japan) and the No. 4 self tapping endodontic stabilizer implant with its corresponding bone drill and a millimeter measuring rod (Weiss et. al , Oratronics Inc, New York). In the first appointment, the root canal treatment was initiated, working length determined to be 16 mm and cleaning and shaping done till 2mm beyond the apex(18mm) till the file of ISO size 110 (Mani) using a conventional hand filing technique for cleaning and shaping of the root canals. Normal saline solution was used for copious irrigation during the procedure. An interappointment intracanal dressing was given with apexcal (Ivoclar vivadent, Liechtenstein) and the access was sealed with Glass Ionomer cement (Fuji Corporation, Japan). After three weeks in the second visit, proper cleaning of the canal was done with copious irrigation with saline solution, the bone drill corresponding to the No.4 endodontic stabilizer was mounted on an endodontic handpiece (X Smart, Dentsply, Germany) and used at slow speed (800 rpm) to prepare the apical third of the root canal and a 10mm receptor site in the bone. A millimeter measuring rod

was placed through the canal into the prepared channel and a radiograph exposed to ascertain the length to which the receptor site extends beyond the root apex by counting the number of millimeter serrations on the rod surface as visible in the radiograph.

After the exact working length was determined, the rubber stopper was placed at the marked length on the No.4 endodontic stabilizer and it was tapped into the canal with mild apical pressure and clockwise rotation till the stopper reached the incisal edge. The implant was then retrieved by anticlockwise rotation. This led to the tapping of the apical third of the dentin and the channel in the bone so that there is close adaptation of the implant to the tissues when it is in its final position.

The canal was thoroughly irrigated and dried with paper points, the intra osseous portion of the endodontic implant was marked and only the portion of the implant that would be inside the canal is coated with Type II glass ionomer cement and the implant was tapped back into place. The excess length of the stabilizer extending beyond the incisal edge was sheared off using a diamond disk while maintaining finger pressure to minimize vibration and the access sealed with glass ionomer cement. Figure 3 shows an immediate post operative radiograph.

The patient experienced no post operative pain or swelling and healing was uneventful. He was scheduled for post operative evaluation at 1 month interval for 6 months. The follow up radiographs showed no signs of deterioration. A one year radiographic follow up showed good periapical healing (Fig 4). The restoration of the adjacent tooth was done using a three unit fixed partial denture after six months using the stabilized tooth as an abutment.

Case Report 2

A 24 year old male patient reported to the Department of Conservative Dentistry and Endodontics, complaining of pain and loosening of the upper front tooth following a road traffic accident. Clinical examination revealed that the right maxillary central incisor 11 was extremely mobile in the labio lingual direction with inflamed gingiva and various enamel craze lines. Enamel craze lines were also seen on the left maxillary central incisor 21. 11 was tender on percussion and the probing depth was found to be within normal limits in 21. A periapical radiograph of 11 indicated a horizontal root fracture 1mm below the crest of the alveolar bone (Fig 5). There was no evident periapical changes noted in the radiograph.

A provisional diagnosis of horizontal root fracture in 11 was made. There was no adequate tooth structure for the construction of a post and core. Adequate retention and resistance form could not be achieved without encroaching on the biological width. Hence after reviewing the risks and potential outcomes, a treatment plan consisting of removal of the coronal fragment of the fractured tooth, initiation of endodontic therapy, forced eruption of 11 and reconstruction using a No.5 endodontic stabilizer which is a single unit post core and implant stabilizer was presented to the patient and an informed consent was taken.

The treatment was carried out in multiple sittings In the first appointment, the coronal fragment of the tooth was removed and endodontic therapy was initiated in 11. Working length was established using radiographic technique to be 11mm. Cleaning and shaping of the root canal was done using conventional hand filing technique with stainless steel files (Mani Inc, Japan) till ISO size 90 using normal saline as an irrigant. An interappointment intracanal dressing with calcium hydroxide (Apexcal, Ivoclar Vivadent, Leischenstenin) was given for one week after giving a coronal seal with IRM. In the second appointment the orthodontic extrusion (Fig 6) of the root of 11 was initiated by bonding brackets on adjacent teeth, drawing an arch wire through them , bonding a wire loop into the canal and engaging the loop onto the arch wire by ligation. The extrusion of the tooth was done over a period of three weeks so as to bring the root 2mm supragingival. The tooth was stabilized for four weeks by leaving the orthodontic appliance in place.

This procedure created an unfavourable crown root ratio. In the next appointment the orthodontic appliance was removed, the canal was cleaned thoroughly with copious irrigation with normal saline, cleaning and shaping was done till 2 mm beyond the apex till ISO size 90, the bone drill corresponding to No.5 stabilizer (Oratronics Inc. New York) was used in a slow speed handpiece to create a channel in the bone extending beyond the apex for 16mm. The working length was confirmed by making a periapical radiograph with the corresponding millimeter measuring rod in place and counting the millimeter markings extending beyond the apex. The No.5 Endodontic stabilizer with a core (Oratronics Inc. New York)was used to tap the apical dentin and the channel in the bone till 16mm. The stabilizer was retrieved with counter clockwise rotations. From the horizontal shoulder of the core of the stabilizer the portion apical to 27mm (11+16mm) was cut off. The canal was dried with paper points, the intracanal portion of the stabilizer was coated with type II Glass ionomer cement and the stabilizer was tapped into place.

Recall examinations were conducted at periodic intervals for 8 months with continued normal findings. At the follow up appointment after two weeks a heat cure acrylic temporary crown was cemented. At 8 months the examination indicated that the tooth was well stabilized and asymptomatic, which was verified by a periapical radiograph which showed good periapical healing and a normal periradicular picture (Fig 9).

DISCUSSION

Since the introduction of endodontic implants into dentistry it has been used in clinical practice with varying degrees of success. The added advantage of endodontic implants was that they are completely encased within tooth and bone. Theoretically it eliminates any communication with the oral cavity and its accompanying bacterial flora and reduces the susceptibility to infection.

Despite improvements in materials and metallurgy most implants of early period displayed high percentage of failure. Early endodontic pins were smooth tapered usually made of a chrome cobalt molybdenum alloy. The tapered pins showed inherent problems such as lack of retention and inadequate apical seal [6]. Judy et al and Zmenur reported substantially stronger retention for threaded endodontic implants compared with smooth tapered implant in vitro for single rooted teeth.

In the new design of the stabilizer used (Fig 10) the implant consists of a major diameter and a minor diameter. The drill corresponds to minor diameter so that when the implant is tapped into place the apical dentin and bone get firmly engaged onto the flutes leaving minimal gap and thus obtaining a perfect apical seal.

An additional feature is the groove running on the crest of the serrations which is twofold in function. One is that within the canal it acts as a sluiceway for escape of the endodontic sealing material in an occlusal direction as the implant is tapped apically hence preventing the apical extrusion of any cement. Secondly within the bone it helps in better stress distribution by attaching to the periimplant ligament fibers. The titanium alloy allows better osseointegration as it has been proved to have a good osteogenic effect.

The clinical success of the two presented cases as assessed by the clinical examination and the follow up radiograph suggest that a proper case selection, the improvement of the implant design, the better predictability of the technique employed and the osteogenic potential of the titanium alloy has brought back Endodontic stabilization as a viable treatment option for improving the prognosis of teeth with an impaired crown root ratio. However further clinical evaluation and long term clinical studies are suggested.

Figure 1.
Pre operative radiograph of 21 showing apical root resorption.

Figure 4. 1yr follow-up radiograph.

Figure 7.Immediate post operative radiograph

Figure 2.The armamentarium - 25mm long K-files size 90-140, millimeter measuring rod and the titanium alloy endodontic stabilizer.

Figure 5. Orthodontic extrusion of the root fragment.

Figure 8.Post operative photograph with No.5 Endodontic stabilizer in place.

Figure 9.8-month follow-up radiograph.

Figure 3. Immediate post operative radiograph.

Figure 6. Pre operative radiograph of 11 showing horizontal root fracture.

Figure 10. Serrated design of endodontic endosseous implant.

REFERENCES

1) Girish Parmar, Pramod Kumar AV. Custom-fabricated endodontic implants- Report of two cases. J Endod 2000; Vol 25 (5): 301-3

2) Franklin S Weine, Alfred L Frank. Survival of the endodontic endosseous implant. J Endod 1993; Vol 19(10): 524-8

3) John I. Ingle, Lief K. Bakland. Endodontics 5th ed 2002: B. C. Decker 732-736.

4) Strock AE, Strock MS . Method of reinforcing pulpless anterior teeth – preliminary report. J oral surg 1943 Vol1:252-5,

5) Frank AL. Improvement of the crown-root ratio by endodontic endosseous implants. J Am Dent. Assoc 30: 188-97, 1967

6) Kenneth W. Judy, Charles M. Weiss: Improved technique of endodontic stabilization – Biofunctional considerations: Manual, Oratronics Inc Newyork.