

INTENTIONAL REIMPLANTATION: SALVAGING ENDEAVOUR

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ABSTRACT

Intentional reimplantation is a procedure in which an intentional tooth extraction is performed followed by reinsertion of the extracted tooth into its own alveolus. This article entitles to describe and discuss a case of reimplantation of a tooth with failed root canal treatment. Also indications, contraindications, factors influencing the result and success rate of intentional reimplantation procedure are addressed.

KEYWORDS: *Intentional Reimplantation, Apical Surgery, Endodontics*

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INTRODUCTION

Intentional replantation (IR) is a procedure which involves the “purposeful removal of a tooth and its reinsertion into the socket almost immediately after sealing the apical foramina.”¹

Any tooth that can be atraumatically removed in one piece is a potential candidate for intentional replantation, which involves root resection/preparation/filling following atraumatic extraction and reinsertion of the extracted tooth in to the socket.³

While it is usually a treatment “of last resort,” success rates have been shown to approach 95%.²

With good case selection IR procedure has shown to be a reliable and predictable procedure in several case reports.^{4,5,6}

Since the case is selection plays pivotal role in success of IR, several key factors must be taken into considerationsuch as 1) patient factors and physical limitations; 2) endodontic and anatomic tooth factors; and 3) operator factors such as the manual dexterity, skill and while performingatraumatic extractions⁷,knowledge and availability of dental biomaterials.

Patient factors include; difficult intraoral access and visualisation⁶, 12 patients’ rejection for retreatment. Physical limitations such as inaccessible intraoral site, inadequate mouth opening may cause major hindrance, while IR is considered ideal when the operator obtains good access and visualisation of root apex, periapical and periradicular infection and furcation areas.^{6,8}

Tooth factors include iatrogenic impediments such as presence of crowns, posts or fractured instruments, complicated coronal endodontic retreatment⁷, anatomical impediments such as narrow/calcified root canals, grossly overfilled canals, other unresolved/unexpected pathos is and persistent pain after conventional endodontic retreatment.IR is indicated in cases where periradicular surgery with extensive bone removal is required or in cases of odontogenic maxillary sinusitis associated with an infected tooth.^{5,7,9}

In many other cases such as teeth with dental anomalies w or second molars in particular, which are likely

to have fused/convergent roots, or for single rooted teeth with persistent periapical pathology.^{7,10,11}

However, every individual case and the operator's ability must be assessed before planning IR, because appropriate case selection, the aetiology of the affected tooth and the indication for IR will have a remarkable influence on treatment outcome. The biocompatibility of the root canal filling material will also affect the healing process and the prognosis of the case following IR.^{3,13}

CASE REPORT

The following case exemplifies above point beautifully.

Patient aged 27years reported to Dr. Shinde's Dental Care Centre, Dadar, Mumbai, with the chief complaint of pain on chewing from the lower right side especially pointing to the lower right 2nd molar (47). Clinical Examination revealed deep traumatic bite and pain in centric occlusion demonstrating traumatic occlusion.

There was no evidence of any carious lesion but she had a history of third molar extraction about few years back.

On performing vitality tests (Ice stick) positive immediate cold response was noted which clearly revealed signs of hyperaemia. IOPA examination did not reveal any incidence of periapical pathology.

The treatment plan was explained to her and a decision to do an endodontic treatment for 47 was taken.

Endodontic treatment was initiated, access opening was done with endo access burs (coltene). Pulp chamber showed the presence of two canals, mesial and distal. The Pulp was extirpated with H files and the canals were enlarged till size 20 with all the standard protocol followed.

It was decided to use Hy flex^{cm} (coltene) files for cleaning and shaping. The canals were shaped to size 04 taper size 40.as the Master apical file.

The canals were then filled with calcium hydroxide paste (apex cal vivadent) which was left inside the canal for one week and the care was taken to keep the tooth out of occlusion by reducing the plane of occlusion.

During this procedure it was noted that the bite was too deep and there was just about 3 to 4mm of distal marginal ridge left in relation to the gingival crest.

Patient was called after a week. The patient was asymptomatic and hence it was decided to obturate by using a pexit plus as a root canal sealer (ivoclarvivident). The access cavity was sealed on the following day using reblida (voco) a core build up material.

Crown placement was postponed for 6 months to allow the lesion to heal and to avoid the likelihood of condition called apical periodontitis resulting from traumatic occlusion.

The patient thereafter was kept under observation.

However, the patient came back after 9months with the complaint of dull pain on chewing. IOPA examination revealed a periapical lesion.

Taking patient into confidence and obtaining informed consent, endodontic retreatment was performed wherein, sustained release Chlohexidene guttapurcha (Activ points Roeko) were used as an intracanal medicament which was kept for a week. Following a week time reobturation was carried out with calcium hydroxide containing root canal sealer

(Apexit Plus).

Patient's symptoms were subsided and condition was stable for a month. However, on recall after a month, IOPA revealed persistent periapical lesion. The patient did have bouts of pain. Hence the decision of reimplantation was considered as a sort of last resort to salvage the tooth. This decision was taken as the patient was very keen to save the tooth.

After achieving complete local anaesthesia (2% lidocaine with 1:80000 adrenalin), the tooth was intentionally and gently extracted by means of a suitable periosteal elevator. The PDL and root surface area was left untouched. The extracted tooth was effectively hydrated with constant saline irrigation, following which replantation was carried out.

The patient was given postoperative oral hygiene instructions and was asked to use an antiseptic mouthwash (0.2% Chlorhexidine). Also the patient was advised to have a soft diet, and not to chew on the surgery site. The tooth was examined postoperatively at the end of 1st and 2nd weeks. Follow-ups were carried out for 3 months.

Tragically after 3 months the decision was taken to mislay the tooth due to deep bite, long standing trauma from occlusion and most importantly, prosthetic limitations to place the crown due to the terminal position of the tooth (47) in the arch.

DISCUSSIONS

Intentional replantation in dentistry has been performed for more than centuries and was used extensively to manage odontalgia.⁴

Way back in 1561, Pare first recommended IR where a healthy instead of a diseased tooth was mistakenly extracted.⁵ Later in 1712, Pierre Fauchard⁶ reported stable follow-up of replanted a tooth. It was in 1881 Thompson⁷ emphasised the importance of peri-cemental tissues in the successful treatment outcome following replantation. Later, Fredel⁸ in 1887 and Scheff⁹ in 1890 addressed the role of periodontal ligament cells with regard to external root resorption after replantation. However several issues in the replantation were prodded, such as need for amputation of root apices, immediate or delayed replantation, root-canal obturation before or after replantation, removal or preservation of periodontal ligament cells and the goal of ultimate healing- bony ankylosis or ligament repair and hence evoked the sharp criticism for the technique and successful outcome of replantation perse.

Many reasons for an adverse outcome following replantation have been discussed which include: the tooth can fracture during extraction; trauma to the peri-cemental tissues, reducing the likelihood of reattachment; infection; external root resorption; and ankylosis. Therefore, it is extremely important to understand that this treatment option is the last choice, and should be selected only when all the other options of treatment—non-surgical and surgical—have been failed. However, in cases where surgical approach would be very invasive, such as the removal of thick bone from the buccal aspect of a second mandibular molar or on the lingual root of a mandibular molar IR can be considered as leading treatment option.

The factors which encourage healing such as reduction in extraoral time, atraumatic extraction/reinsertion, prevention of damage to tooth roots, adequate apical seal in terms of depth, material compaction and characteristics, play pivotal role in successful outcome following IR. Reduced extraoral time prevents dehydration and damage to periodontal ligament cells which are crucial in the periradicular healing process and prevention of resorptive processes such as

replacement resorption, ankylosis, internal and external root resorptions.¹³ Apart from infection, resorption is also a key reason why IR and traumatically avulsed teeth fail. Damage to buccal/lingual alveolar plate, missing PDL or necrotic cementum due to excessive extra-oral time, dehydration and/or trauma, may cause replacement resorption or ankylosis and in turn failure of IR procedure^{9,12,14,15}

IR is considered successful if radiographic and clinical evidences are supportive. Clinical comfort, absence of symptoms such as tenderness to palpation or percussion, return to function and radiographic resolution of periapical lesion indicate favourable treatment outcome following IR.

On the contrary signs of infection/inflammation such as presence of sinus tract, swelling or a deep periodontal pocket, persistent radiographic periapical lesion are considered as let-downs of IR procedure. Most failures were reported to occur due to some form of resorption or periodontal problem¹² which is generally diagnosed after 1 year, however, inflammatory resorption and replacement resorption (ankylosis) can be usually observed after 1-2 months.¹⁸

Other causes for failure of IR can be inadequate root-end filling material and its depth, as well as root resection. Several properties of root-end filling material such as sealing ability, antibacterial activity, and more importantly, ability to induce cementogenesis have been found to effect the successful outcome of IR.^{21,22} The material must have good sealability as this will greatly influence the prognosis of apical endodontic surgery by preventing the penetration or growth of bacteria as the single most common cause of endodontic failures.²¹ The role of coronal and apical seal, its effectiveness in preventing re-infection and the ability of biomaterials to induce healing and undoubtedly increases the success rate of IR.

There are some absolute contraindications for IR such as, in immune-compromised/suppressed patients, teeth with potential high risk of fracture/trauma (divergent rooted molars), poor patient compliance and oral hygiene. For instance, root-fractured molars¹⁹, periodontally involved⁷ or traumatized teeth with evidence of ankylosis and/or replacement resorption²⁰ are likely to have lower prognosis compared with endodontically failed teeth.

Although the success rate in several case series is reported to be ranging from 72-89%⁷ many more recent case reports have reported 100% success rates for IR when performed for a variety of reasons^{4,16,17,12} Comparing success rates of IR is problematic as case selection is critical; moreover the variability in tooth type and follow-up time creates confusion. However more clinical trials are required to provide higher level of evidence.

In this case report it is important to note that despite the favourable patient and operator factors, excellent choice of biomaterials, our efforts to salvage the tooth with IR failed due to poor case selection due to limitations of occlusal and prosthetic factors such as deep bite, long standing trauma from occlusion and most importantly, prosthetic limitations to place the crown due to the terminal position of the tooth (47). Although antibiotics were not prescribed since biomaterials with excellent antimicrobial properties were used, persistent periapical lesion at the end of 3 months doomed to mislay the tooth following IR

Furthermore, with good case selection, the skilled practitioner may find IR simpler to perform than endodontic (re)treatment or periradicular surgery. Biomaterials with excellent seal ability and antimicrobial properties may help to make IR a more standard form of therapy, when selected rightly. The advantages of IR for the patient include reduction in clinical time, complications and expense compared to non/surgical endodontic (re) treatment. Furthermore, with good case selection, the skilled practitioner may find IR simpler to perform than endodontic (re)treatment or periradicular surgery.²³

CONCLUSIONS

We conclude that intentional re plantation is a viable treatment option in carefully selected cases in which all other treatment options have been exhausted. With careful case selection and suitable training, IR can have a high success-rate with bioregenerative material and be far less expensive than other treatment options. Although IR was deemed suitable for a variety of reasons including operator confidence, intraoral access, tooth coronal restriction, fused roots, adequate orthograde root treatment (failure possibly due to apical deltas and ramifications), and difficulty of access for periapical surgery, in present case report the tooth was forfeited to three inevitable but deterring factors viz. long standing trauma from occlusion and deep bite, prosthetic limitation due to the position of the tooth in the arch,.

Conflict of Interest: 'None declared'.

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APPENDICES

Intentional Reimplantation: Salvaging Endeavour

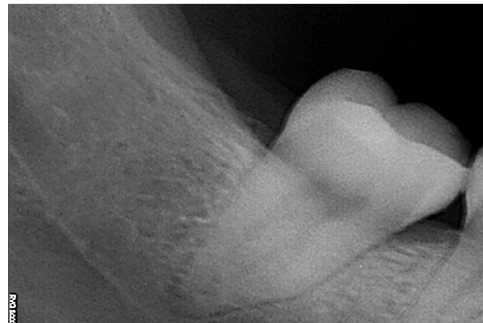


Figure 1: Pre Operative IOPA (47)

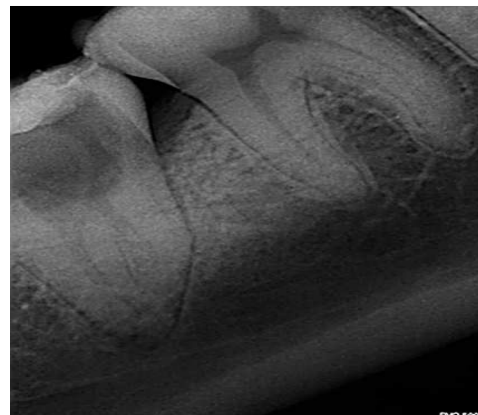


Figure 2: IOPA of Cleaning and Shaping (47)

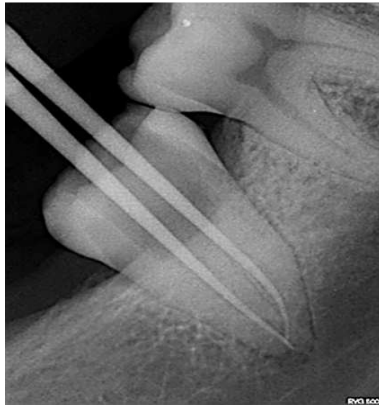


Figure 3: Cleaning Shaping and Obturation

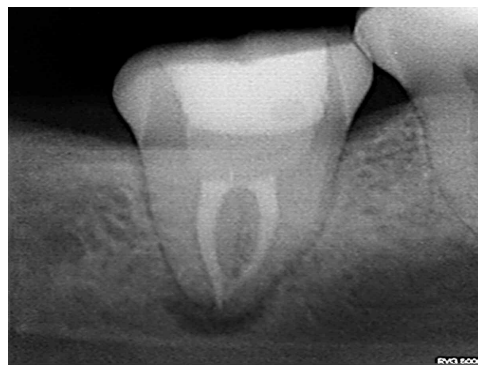


Figure 4: On 9 Months Follow up



Figure 5: Calcium Hydroxide Gutta Purga Points Placed



Figure 6: Reobturation



Figure 7: 2Months of Folowup after Retreatment

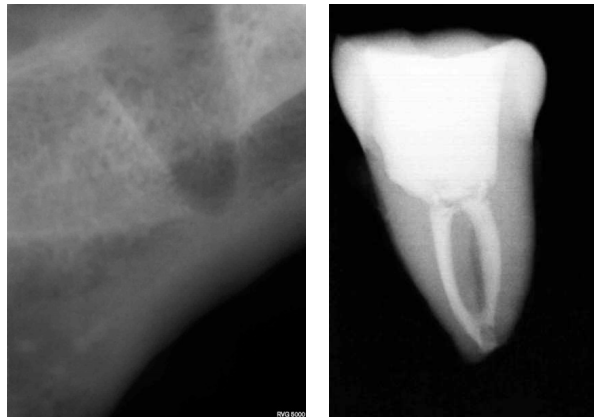


Figure 8: Following Extraction of the Tooth



Figure 9: Reimplantation