Review Article

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Intentional Replantation: An Updated Review

Deepti Pitalia[1*] Ashish Surana[2] Nimisha Kumari[3] Leena Gangil[4]

[1]Reader, Department of Conservative Dentistry and Endodontics, College of Dental Science and Hospital, Rau, Indore, MP, India.
[2]Reader, Department of Orthodontics and Dentofacial Orthopedics, College of Dental Science and Hospital, Rau, Indore, MP, India.
[3]Lecturer, Department of Periodontics, Indraprastha Dental College and Hospital, Ghaziabad, UP, India.
[4]Private Consultant, Department of Oral and Maxillofacial Surgery, Khurasiya Dental Care, Gwalior, MP, India.

ABSTRACT

Background: Intentional replantation is extraction of a tooth to do extraoral root canal therapy, curettage of apical lesion when present, and its replacement in its socket. In some cases, endodontic retreatment or apical surgery is impossible or impractical. In these situations, intentional replantation may be considered. To overcome any complications, the surgical procedure have to be rigorous, the extra-alveolar time properly managed and the splint adapted. Modern microsurgical techniques for traditional root-end surgery including the use of the DOM, staining medium, ultrasonic instruments, and newer, more biocompatible root-end filling materials, may also improve success or survival rates of intentionally replanted teeth.

Keywords: Dentistry, intentional, replantation.

INTRODUCTION

The persistence or development of an inflammatory periapical or periradicular lesion in a previously root-filled tooth, is a significant issue for oral health care providers, especially for endodontic specialists. The primary cause has been attributed to the presence of microorganisms in the root canal system. Several treatment options with varying levels of success have been suggested, including nonsurgical endodontic retreatment and apical surgery[1].Intentional replantation has been defined as the deliberate extraction of a tooth and after evaluation of root surfaces, endodontic manipulation, and repair, placement of the tooth back into its original socket[2] . It is one of the oldest known methods for the treatment of disease of endodontic origin, dating as far back as the 11th century when Albulcasis described a replantation[3] . The evolution of the procedure in more recent times has involved modification of techniques surrounding tooth extraction, root-end resection and preparation, handling of the tooth during surgical manipulation, and materials used for root-end filling [4].The procedure now involves multiple surgical steps that must be executed with precision for the best outcome. Survival of PDL cells has been noted to be a critical factor influencing successful healing.

Indication:[5]

a) When routine RCT is impossible or impractical, as with some patients with limited mouth opening or cannot open for the necessary time.
b) When a previous RCT has been unsuccessful but orthograde retreatment or apical surgery is impractical.
c) Obstruction of canal due to instrument separation or calcification.
d) When surgical access would be inadequate, such as a shallow buccal vestibule or short roots.
e) When an iatrogenic perforation or a perforating internal or external resorption is present, but surgery is impractical.
f) When a foreign body is present in periapical tissues or PDL, but surgery is impractical.
g) If PA radiographs show a large region of rarefaction or a large cyst.
h) When the root canal is furcated as it approaches the apex.

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***Correspondence Dr. Deepti Pitalia.**
Department of Conservative Dentistry and Endodontics, College of Dental Science and Hospital, Rau, Indore, MP, India.
Email: endorthoanuli16@gmail.com

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i) For RCT of immature teeth.
j) For primary teeth, as an alternative to extraction and placement of a space maintainer.
k) Management of vertical root fractures by reconstructing with dentin bonding agents-management of complicated crown-root fractures.
l) For RCT of teeth with certain anatomical malformations such as radicular groove or double teeth.
m) Progressive destruction of periodontal tissues and management of teeth with advanced endo-perio lesions.
n) Management of maxillary sinusitis .

Contraindications[, 5]

a) Patient's medically compromised history may prevent PA surgery or extraction.
b) Extensive caries or no restorability of the tooth.
c) Severe periodontally compromised tooth.
d) Curved roots or the possibility of fracture during extraction or during the replantation.
e) Broken or fractured teeth.
f) When labial/buccal plate has been damaged and gingival inflammation and the involvement of furcation exist.
g) In ankylosed teeth, IR may be indicated only when the ankylosis is diagnosed at the early stages .

TOOTH REPLANTATION PROCEDURE:

Atraumatic extraction:

Several authors have recommended avoiding the use of dental elevators and limiting the application of dental forceps to the crown of the tooth as a means to minimize trauma to the PDL cells [6,7,8,9].This step has been considered by some as the most technique-sensitive portion of the procedure. After extraction of the tooth, the roots are examined for fractures, additional canals or portals of exit, isthmi, and any additional anatomic features requiring attention.

Extra alveolar time:

Recommendations for extraoral times have also varied. In 1966, Grossman[2] reported the time out of the mouth should be ''a matter of minutes,'' noting specifically that the PDL can be kept alive for 15 to 20 minutes. Kratchman [9] recommended a maximum extraoral time of 10 to 15 minutes. In the 1994 report by Dryden and Arens [10] on intentional replantations, J. Andreasen was noted to have reported 90% success rates when avulsed teeth were replanted within 30 minutes.

Tooth handling method:

Kratchman in 1997 [9] suggested holding the extracted tooth in dental forceps while performing the root-end procedures. He also recommended performing the root resections while periodically submersing the tooth in a bath of Hank's balanced salt solution (HBSS) to maximize the PDL survivability. Choi et al [11] and Choet al [12] report holding the tooth in saline-soaked gauze during manipulation.It is important that the gauze is completely saturated with saline and not sterile water, as dry gauze or sterile water may desiccate root surfaces and compromise the vitality of PDL cells [13]

Root end preparation:

With the aid of a dental operating microscope (DOM) to properly magnify and illuminate the areas being evaluated[9] following root inspection, root resections are made using a high-speed handpiece, ideally of at least 3 mm, which has been shown to eliminate 98% of apical ramifications and 93% of lateral canals[14] .

A root-end filling material is then placed and condensed into the preparation. Initially amalgam was the material of choice for root-end filling; however, newer materials, such as Super ethoxybenzoic acid (SuperEBA), mineral trioxide aggregate (MTA), and calcium silicate cements, have shown superior ability to seal the root canal system and demonstrate greater biocompatibility[15].

Socket curretage:

Before tooth replacement, the socket may be curetted to remove any remaining granulomatous tissue or cystic remnants. This practice has been somewhat controversial. Some authors have advocated curettage of the most apical portion of the socket while avoiding contact with the socket walls [16,17]. Others have recommended avoiding curettage of the socket all together. Instead, surgical suction devices are used to remove only the blood clot, with careful attention to avoid any contact with socket walls [7,9]. Once the socket has been prepared

to receive the tooth and is free of any obstruction, the tooth is gently placed in the socket.

Splinting:

Although, ankylosis and replacement resorption may be observed with a long-term splinting, significant improvements outcomes with short-term splinting have not been shown [18,19,20] . Now it's recommended that the tooth be splinted for up to two weeks contrary to six weeks as before[21]. Others studies show that suture splint appears to be more favorable than wire composite splint. Indeed, suture splinting provides physiological loading on the replanted teeth, which might facilitate periodontal healing .[22,23]

Healing and complications:

If there is only a small damaged area, cells which have the potential to form a new cementum and periodontal ligament are capable to cover the damaged root. This type of healing is termed surface resorption. Clinically, the tooth is asymptomatic and has a normal percussion tone [24]. As reported by Andreasen et al., ankylosis comes about when more than $9mm^2$ of the surface root is damaged [25]. Ankylosis is defined by the fusion of the bone and the root surface; consequently, the tooth is not mobile and gives a high percussion tone. Over the time, physiologic bone turnover takes place and similarly to the adjacent bone, the root is resorbed and replaced with bone. This process is called replacement resorption. If inflammatory stimulus persists, healing cannot occur and inflammatory resorption takes place. During this process, bone is resorbed until the tooth becomes mobile and extruded.

CONCLUSION

Although until this day intentional replantation is considered as the procedure of the last resort, dentists may still be unfamiliar with this technique. However, when the procedure is carefully performed with proper case selection, success can be expected with an acceptable survival rate. Intentional replantation should be considered as an alternative treatment in the selected case and should be part of the therapeutic armamentarium. Knowledge of the prognosis, the surgical procedure, the risk and benefits may assist patients and dentists in effective decision-making.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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