

Comparing Healing with Scalpel and Laser in Root End Resection followed by MTA and PRF Placement

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DOI: 10.31080/ASDS.2022.06.1342

Received: January 20, 2022

Published: March 24, 2022

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Abstract

Aim: The purpose of this case report is to analyze the result of healing with scalpel and laser in root-end resection followed by MTA and PRF placement.

Materials and Method: Apicoectomy was done with scalpel and laser followed by root-end resection and placement of MTA W.R.T 11 21 21 22 and PRF W.R.T 31 41

Keywords: Scalpel; Laser; PRF; Root End Resection; MTA

Introduction

Comparison of various surgical instruments which are used for cutting of oral mucosa has been carried out to facilitate ease of incision, acute soft tissue injury, swelling, rate of wound healing, degree of hemostasis and charring [1]. The gold standard tool for incision is considered to be the scalpel which is commonly known as cold knife [2]. The scalpels became commonly employed due to their inherent properties like ease of use, accuracy and minimal damage caused by its usage to the surrounding tissues. Although, the scalpels inherit many advantages, the major drawback faced by scalpels is its inability to facilitate the hemostasis which aids in surgeries related to highly vascular tissues [1].

Lasers are considered as an effective alternative to conventional surgical systems. Harris and Pick introduced the diode lasers in

mid 90's by Harris and Pick. According to the reports, diode lasers having a wavelength range of 810 to 980 nm, either in continuous or pulsed mode, are considered as a possible instrument for soft tissue surgery in the oral cavity (Suter VG., et al. 2010) [2].

The lasers possess innumerable advantages as compared to the conventional scalpel technique such as instant sterilization, hemostasis, less edema, minimized mechanical trauma, ease of soft tissue ablation, reduced bacteremia, less wound contraction, miniscule scar formation, operative and post-operative pain is also reduced [3]. One of the most important aspects of endodontic practice is to provide a three-dimensional seal in the root canal space in order to prevent bacterial and their byproducts from penetrating into periradicular tissues [8].

Mineral trioxide aggregate (MTA) is commonly used as a root end filling material which is a bioactive endodontic cement (BEC) mainly comprised of calcium and silicate elements. This cement was first introduced by Torabinejad in the 1990s [4]. MTA poses various desirable advantages such as it has ability to set in the moist environment, has low solubility, good sealing ability and is biocompatible. Another alternative to root end filling material in general practice is PRF (Platelet Rich Fibrin) which is basically a fibrin matrix polymerized in a tetra molecular structure, with incorporation of Cytokines, platelet, leucocytes and circulating stem cells [7]. The PRF facilitates accelerated healing of tissue and reduces the post operative discomfort to the patient.

In this article, a comparison study is reported between the healing capabilities of tissue which is incised using scalpel and laser. In addition, the comparison between the root end filling materials namely MTA and PRF are also detailed.

Case Report 1

A 23 years old patient came to the department of conservative dentistry and endodontics with a chief complain of pain in upper front tooth region since 2 months. pain was dull, continuous, throbbing in nature with history of trauma 4 years back. medical history is noncontributory. Clinical examination revealed Ellis class 3 fracture i.r.t 11 and Ellis class 2 fracture i.r.t 21. cold test gave no response w.r.t 11,12,21,22 as compared to control tooth. Radiographic examination showed periapical radiolucency involving 11, 12, 21, 22. The treatment plan of non-surgical root canal treatment w.r.t 11,12,21,22 followed by root end resection w.r.t 11,12,21,22 was explained to the patient and consent was obtained after the access opening of 11,12,21,22 was done the working length was determined using k file and thorough shaping and cleaning was done. The teeth were then obturated using warm lateral condensation.

Raising Ochsenbein –Luebke (O-L) Flap, a periapical surgery was done and periapical pathosis was enucleated. Apically 3mm of maxillary right and left central and lateral incisors were resected from the apex and using ultrasonic tip retrograde cavity was prepared followed by placement of 3mm thick MTA as a retrograde material. Confirmation of retrograde filling material was done using radiograph and the sutures were placed. Patient was recalled after 10 days for suture removal.

Figure 1: a) Preoperative Radiograph. B) Postoperative Radiograph.

Figure 2: a) Marking of Flap. b) Flap Raised.

Figure 3: Root End Resected.



Figure 4: MTA Placed

Figure 5: a) Suture Placed. b) suture removed.

Case Report 2

A 15-year-old patient reported to the Department with a chief complaint of pus drainage in mandibular symphysis region since 1 year.

On clinical examination sinus was traced using 15 no. gutta per-

Figure 6: Sinus Tracing Done.

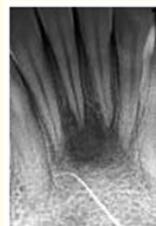


Figure 7

cha and a periapical radiolucency was observed i.r.t 31,32,41,42

Cold test was negative i.r.t 31,32,41,42. Teeth presented a delayed response to electric pulp testing i.r.t 31,32,41,42. The treatment planned was root end resection w.r.t 31,32,41,42 followed by PRF placement. It was explained to the patient and consent was obtained. After the access opening of was done i.r.t 31,32,41,42 the working length was determined using K file and thorough shaping and cleaning was done. The teeth were then obturated using warm vertical condensation. LASER assisted incision was placed and full thickness flap was raised. The periapical pathosis was enucleated

and 3mm root end resection was done using ultrasonic tip and PRF was placed followed by the sutures placement. The patient was recalled after 10 days for suture removal. The patient was kept under observation for the purpose of postoperative evaluation of healing

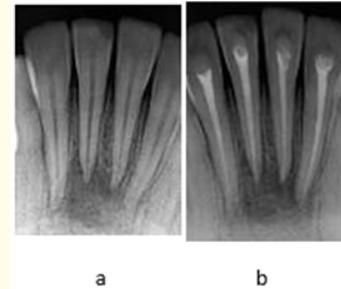


Figure 8: a) Post Operative Radiograph, b) Pre Operative Radiography

Figure 9: Pre-Operative Image.

Figure 10: Marking of FLAP.

Figure 11: Incision Placed Using Laser.

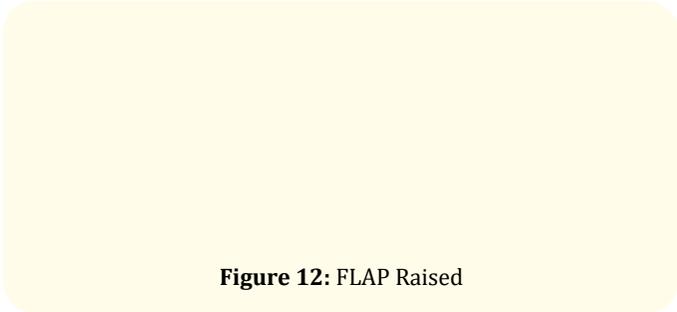


Figure 12: FLAP Raised

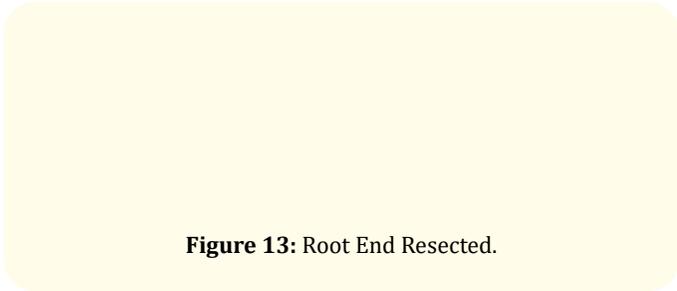


Figure 13: Root End Resected.

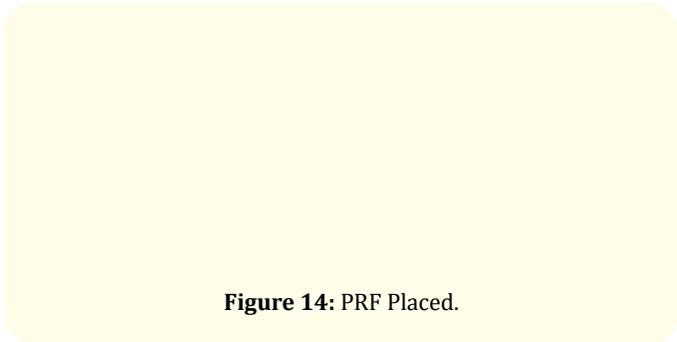


Figure 14: PRF Placed.

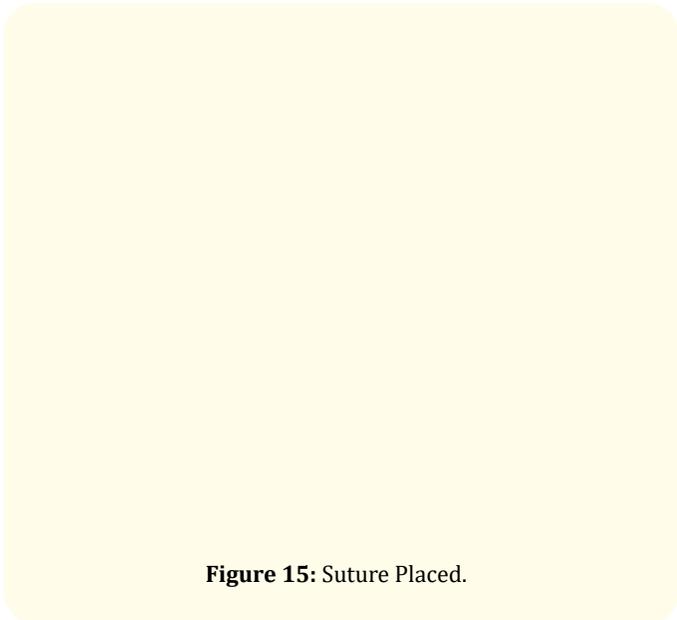


Figure 15: Suture Placed.

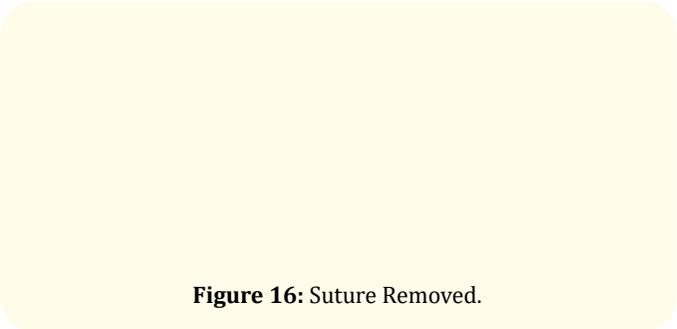


Figure 16: Suture Removed.

of the periapical intervention in 1 Month.

Discussion

Periapical repair and regeneration determine the success of endodontic therapy. Non Surgical root canal treatment will lead to healing of periapical lesion; however, an apicoectomy is an essential treatment option for a periapical lesion that does not heal and

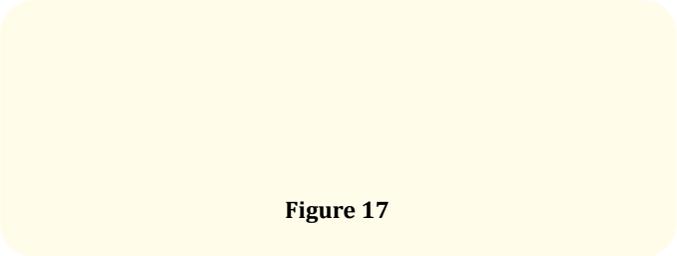


Figure 17

symptomatic periapical pathology [6].

Carbon dioxide laser used in this case report for placing incision, emits energy with a wavelength of 10.6nm. Laser beam is absorbed by tissue of high-water content. It seals blood and lymphatic vessel reducing post-operative edema and pain compared to conventional scalpel. Since there is no physical contact in laser surgery, there is less likelihood of contamination of the surgical site or spread of organisms to adjacent tissues during excision of a focus of infection.

MTA being biocompatible have potential of osteogenesis and promotes healing. It consists of a powder of fine trioxides and other hydrophilic particles, which hardens in the presence of humidity. MTA shows certain receptor such as bone morphogenic protein and calcium sensing receptors that causes osteogenesis. Properties such has biocompatibility, induction of hard tissue, sealing ability have made MTA an excellent choice for root end filling.

PRF is an autologous material derived from the patient’s blood and thus prevents an immunologic reaction.5 It contains a matrix polymerized with fibrin, with the integration of platelets, cyto-

kines, leukocytes and circulating stem cells 7. PRF being a biomaterial with tissue healing properties, studies suggested that PRF increases osteogenesis due to the growth hormones present in PRF.

In the year 2001, Choukroun, *et al.* developed the PRF production protocol that strive to accumulate platelets and cytokines in a fibrin clot [7]. PRF being introduced in recent years, less number of clinical studies have been produced on its efficacy; nevertheless, positive results have been obtained in fields of oral surgery. Some clinical case reports or series have been produced on the PRF application to endodontic surgery, with the authors generally describing reduced morbidity and discomfort for the patient and accelerated healing [5].

Result

Healing with laser was better than a scalpel and periapical healing with PRF and MTA showed the comparable result.

Conclusion

Based on the results of our and other authors' studies we might conclude that high power diode lasers should be employed in everyday oral surgical procedures due to coagulation effect, sterilization of the surgical site, minimal or no swelling and significantly reduced postoperative pain.

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Based on the result the conclusion is that CO2 Laser should be employed in oral surgical procedures due to sterilization of the surgical site, hemostasis, reduced edema, and post operative pain. PRF when used as an apical barrier accelerated bone filling and helps in guided tissue repair, bone regeneration. However periapical heal-

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