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Comparative assessment of the prognostic value of laser assisted root canal treatment and conventional root canal treatment

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ABSTRACT

Aims: Endodontics is a branch of dentistry which deals with complex architecture of dental root associated pathology, diagnosis, prevention, and treatment of dental pulp and associated periradicular tissue. The aim of this study is to conduct a comparative analysis of prognostic value of laser-assisted root canal treatment (LART) and conventional root canal treatment (RCT).
Materials and Methods: A retrospective analysis of 50 cases equally divided between Laser-assisted root canal treatment (LART) and conventional RCT, was done using Clinician-reported Outcome (ClinRo) protocol by modifying Chugal et al scoring criteria.
Results: Statistical analysis using Mann-Whitney U tests revealed no significant correlation between gender and total treatment quality score. However, significant correlation was found between treatment modalities, and with laser assisted RCT treatment it showed a superior correlation and better prognostic results.
Discussion: The radiographic analysis focused on periapical lesions and root canal filling quality. Laser-assisted RCT demonstrated a higher proportion of complete healing cases for periapical lesions and improved root canal filling quality compared to conventional RCT.
Conclusion: The study supports the potential benefit of laser assisted RCT in non-surgical endodontic interventions. Laser-assisted RCT showed better prognosis in terms of periapical healing and root canal filling quality when compared to conventional RCT. The study encourages further research and clinical validation to establish laser assisted RCT as a viable option in endodontic therapy.

1. Introduction

Endodontics is a branch of dentistry that incorporates the biology of healthy dental pulp, in addition to aetiology, pathology, diagnosis, prevention and treatment of diseases and injuries of dental pulp and associated peri-radicular conditions. The aim of endodontic treatment (commonly known as root canal treatment) is decimation of diseased dental pulp residue, cleansing the root canal system using biomechanical instrument and adjunct chemical treatments, and obturation of the canals with an inert material and use of intracanal medicament for disinfection and for inflammation reduction. An ideal root canal obturation should be done using an obturating material which is well adapted to canal walls to seal the prepared root canal ensuring dense compaction, thus preventing chances of reinfection or post endodontic complications. The presence of voids in obturation whether it is in apical, coronal or at entire length will result in incomplete obturation, which would allow microleakage, thus increase probability of bacterial regrowth, secondary infection, and poor prognosis of endodontic treatment, i.e. failure.

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The speciality discipline of endodontics has made progress in the technical aspect of root canal treatment over the last two decades, which has provided clinicians with new designs for files and new devices such as use of nickel titanium (NiTi) rotary files[1,2] and use of magnification.[3] With adoption of these advancements, has drastically reduced the time and efforts of clinician by providing excellent biomechanical preparation of pulpal canal thus leading to positive outcome of endodontic treatment.[4]

Despite the high success rate of RCT when performed by experienced practitioners, yet epidemiological studies such as El Quarti[5] and Meirinhos[6] have shown higher prevalence of apical periodontitis associated with post endodontic treatment, hence resulting in failure attributed to reinfection.[4–11] This failure is often attributed to the persistence of infection, with several reports indicating a correlation between poor-quality RCT and AP.

The main caustic pathogen in the event of reinfection or non-healing apical infection is Enterococcus faecalis[12] at times are present alongside other microorganisms such as yeast[13,14] and fungi such as Candida albicans.[15,16] these microorganisms are persistent and tricky as they can gain entrance into tooth via various pathways and establish anaerobic colonies[17] in various parts of the tooth, other than root canal for e.g. dentine tubules, lateral canals, transverse anastomosis between canals.[18,19]

To eliminate this challenge posed by anaerobic microbes vigorous irrigation with antimicrobial irrigating solution e.g. Sodium hypochlorite(NaOCl) and application of intracanal medicament following biomechanical preparation of root canal preparation is considered the 'gold standard' in endodontic treatments.[20] However the intricate three dimensional anatomy of root canal limits the penetration of NaOCl or intracanal medicament into the dentinal tubules, root dentin etc, potentially increasing the risk of treatment failure.[21]

In last 15 years, lasers have also become a part of dental clinical practice and is being used in respect to maxillofacial surgery, implant surgery, periodontal and endo-periodontal surgical intervention. In 1980, the first research paper was published stating lasers use in periodontal procedure[22] but in recent years, laser assisted root canal treatment (LART) has emerged as a promising adjunct to conventional RCT widely used for controlling infection, promoting periapical healing and avoiding reinfection through antimicrobial photodynamic therapy(aPDT) and photobiomodulation therapy (PBMT).[23]

aPDT (photodynamic therapy) is a non-invasive therapeutic method utilizing three components of light sensitive agent such as photosensitizer which is generating reactive oxygen species (ROS) and singlet oxygen (1O2) leading to microbial cell damage.[24]

On the contrary, photobiomodualtion therapy employs a non-ablative photonic energy to modulate cellular behaviour resulting (PBMT)r address the challenge posed by microbial infection, the use of local antimicrobial irrigating solutions, such as sodium hypochlorite (NaOCl), in combination with mechanical instrumentation, has been considered the "gold standard" in endodontic therapy. However, the complex three-dimensional anatomy of root canals limits the penetration of NaOCl into root dentin, potentially increasing the risk of treatment failure.

In recent years, laser-assisted root canal treatment (LART) has emerged as a promising adjunct to conventional RCT. The use of lasers in endodontics offers several advantages, including enhanced disinfection capabilities, improved removal of the smear layer, and reduced postoperative pain. Laser energy can effectively target bacteria within the root canal system and aid in the decontamination of intricate root canal anatomy, ultimately improving treatment outcomes.

The use of lasers in endodontic therapy has been developed through antimicrobial photodynamic therapy (aPDT) and photobiomodulation therapy (PBMT), both of which have been adopted as adjunct alternatives. aPDT utilizes a photosensitizer applied inside the root canal and irradiated by a light source, generating reactive oxygen species (ROS) and singlet oxygen (1O2), leading to microbial cell damage. PBMT, on the other hand, employs non-ablative photonic energy into modulating cellular behaviour, resulting in anti-inflammatory, analgesic, sterilization, reducing dentin hypersensitivity and transpiration of infected dentin and promotes formation of reparative dentin in root canal.[25] Both treatment modalities have shown benefits in endodontic treatment, potentially reducing the risk of failure, and improving treatment success rates.

While studies[26–29] have investigated the effectiveness of laser assisted root canal therapy (LART) and highlighted its potential benefits, yet studies comparing the prognostic significance of conventional RCT with LART are negligible. Therefore, conducting a comprehensive comparative assessment of these two treatment modalities is crucial to provide evidence-based recommendations for clinical decision-making.

2. Aim

This cross-sectional study with aim to conduct a retrospective comparative analysis of prognostic value of laser assisted root canal treatment (LART) and conventional root canal treatment. Patients who underwent root canal treatment through conventional RCT and laser assisted root canal treatment in 2022 (i.e. from January 2022- December 2022) were included and followed upto December 2023 (i.e. 12 months follow-up period) using Clinician reported outcome (ClinRo) measure.

The primary objective of this study is to compare and assess the prognostic value of laser assisted root canal

treatment(LART) and conventional root canal treatment (RCT) by analyzing a range of clinical parameters such as survival rates, periapical healing and post-operative pain etc. with this study we aim to determine the effectiveness to analyze a range of clinical parameters, including survival rates, periapical healing, postoperative pain, and patient-reported outcomes, to determine the effectiveness and superiority of one treatment modality over the other. The findings from this study can guide dental practitioners in selecting the most appropriate treatment approach based on patient-specific factors and clinical considerations.

In total, analysis of pre and post treatment radiographic images of 50 cases were carried. These cases were divided into two categories: 25 cases each category as based on the treatment they have undergone in retrospect.

3. Material and Methods

3.1. Study design

In this study, retrospectively 200 patient files were collated from PRM software version 5.2. This study included cases from patient files of patients aged between 18 - 80 years who sought endodontic treatment at our dental clinics in which 100 patient files were those with conventional RCT invoice and remaining 100 patients were for laser assisted RCT. Cases were selected based on their availability of pre- and post-treatment radiographic images and were allocated to either the conventional RCT or laser-assisted RCT group.

Among the collated data, cases with insufficient pre-treatment, post treatment or follow up radiographs were excluded from analysis. Also, cases with poor quality of radiographs were also excluded. Therefore, out of these 200 patient files, 25 cases were selected for both treatment modalities, i.e.

1. Laser assisted RCT 25 cases.
2. Conventional RCT 25 cases.

In these cases, radiographic images obtained before treatments and follow up were assessed to evaluate the prognostic value of each treatment modality.

3.2. Conventional RCT group

The 25 cases in this group underwent root canal treatment using traditional techniques and instrumentation. The conventional RCT procedures followed standard protocols, including the use of manual or rotary files, irrigants, and obturation materials. The cases were treated by experienced endodontists who followed established guidelines.

3.3. Laser-assisted RCT group

The remaining 25 cases in this group received root canal treatment with the assistance of lasers. Laser devices with appropriate settings were used to perform various stages of the RCT procedure, including disinfection, cleaning, and shaping of the root canal system. Trained and experienced endodontists performed the laser assisted RCT procedures. The lasers used in this study included diode lasers with 980nm wavelength are following:

1. Pioon H1 dental diode (from Wuhan Pioon Technology with model no. PNH210484 and PNH210490).
2. SOGA iLASER II Pen Type (from Shenzhen Soga Technology with model no. SNILII2308046 and SNILII23A05006).

3.4. Data collection and radiographic image analysis

All pre-treatment and post-treatment radiographic images were obtained using standardized techniques and equipment. The pre-treatment radiographic images here are referring to radiographs taken at the time the patient reported to the clinic with a chief complaint associated with the tooth. The post-treatment radiographic images here are referring to radiographs taken after the completion of root canal treatment during the followup visits i.e. 3, 6 and 12 months. Here in this study, 12-month followup images were collected for each case as suggested in Bardini et al.[30] The images were captured in digital format, imported, and stored in the CLOVE Dental PRM software, from where the images were extracted for analysis. As per Clinician-reported outcome (ClinRO) study protocol is where the clinician, any healthcare professional individual who is professionally trained to observe and evaluate the outcome based on the clinical status. Here, two calibrated and blinded evaluators (P.R and S.S) reviewed the cases in consensus and assessed the radiographic images to minimize bias. The evaluators allocated the score for each case assessing each criteria (Figure 1). Evaluator 1 (P.R) had more than 4 years of experience of evaluating skeletal and dental radiographs for clinical evaluation, age estimation method and dental image reconciliation for both clinical and forensic casework. Evaluator 2 (S.S) had almost two decades of expertise in dentistry as a clinician, quality auditor, and radiograph reviewer for diagnostic, prognostic, and clinical auditing purposes of dental treatment operations. While evaluator 3 (L.V.A) has almost 40 years of dental expertise and is also a veteran of the Indian army dental corps, who intervened as referee in case of difference in opinion between the two evaluators, to establish the score for the debated criteria or case in question.

The evaluators followed Clinician Reported Outcome (ClinRO) protocol and assessed the pre and post radiographic images using modified Chugal's scoring criteria.[31–34] The study was published by Nadia et al (2017) provided the scoring criteria which can be used as baseline and calibration parameters for assessing the endodontic

treatment prognosis and optimal treatment outcomes for both conventional RCT and Laser assisted root canal treatment in this study, which are highlighted as following Table 1:

This criterion established a foundation, serving as a baseline and scoring metric for evaluating the prognosis of endodontic treatments. The parameters mentioned in this study pertain to both conventional root canal and Laser assisted root canal treatment, offering insights into optimal treatment outcomes, thus playing a pivotal role in standardizing the Clinician reported outcome evaluation process are helpful in standardizing the evaluation process, fostering uniformity in interpretation of results.

The total treatment quality is the aggregate score for each case is calculated by summing the score assigned by the clinical evaluators (P.R and S.S) to all individual parameters based on modified Chugal et. al as shown in Figure 1. As the study design is based on clinician reported outcome protocol here in this study, the observations are made by trained healthcare professional (P.R and S.S).Therefore patient satisfaction parameter mentioned in Table 1 is scored zero for all cases (i.e. in both conventional RCT and Laser assisted RCT groups). Hence total treatment quality is cumulative score of evaluated parameters providing a prognostic value of non-surgical endodontic treatment based on examination of case radiographs i.e. pretreatment radiographs and 12-month followup radiograph as post treatment radiograph. A lower total treatment quality score signifies a more favourable and efficacious treatment outcome.

Table 1 and Figure 1 also discusses radiographic findings evaluating the apical periodontal region in radiographs. The PAI (periapical index) is a scoring system introduced by Orstavik et al (1986) that uses the scale of 1 to 5 i.e. ranging from healthy to severe periodontitis. In both clinical and epidemiological studies, PAI index has been used as baseline i.e. Increase in extent of periapical radiolucency post treatment suggests failure while absence or diminution denotes the onset of the healing process. Radiographic Images were displayed on a Samsung Crystal 4K Neo Series HD TV (model BOB15GSPQW, resolution 3840 X 2160 pixels). Images were imported and enhanced for optimal visualization of endodontic treated teeth and its associated periapical regions in GIMP (GNU Manipulation Program version 2.10.34) software.

4. Result

Data collected from the radiographic analysis was statistically analyzed using SPSS software using the Mann Whitney U test. It is a version of the independent samples t -Test that can be performed on ordinary data. It is an alternative test to the independent sample test. It is a non-parametric test that is used to compare two populations.

Table 2 shows a comparative analysis between the two genders and its association with total treatment quality score was calculated using Mann-Whitney U tests, as the sample is not normally disturbed. In Table 2, the population which are compared are Male Participants and Female Participants and their correlation with total treatment quality score. Statistical significance was set at $p < 0.05$. So, in Table 2, the null hypothesis is accepted as the Z value is -1.309 and the p value is 0.1905. Therefore, there is no significant correlation between gender (female and male) and total treatment quality score.

Here in Table 3 presents the correlation between the treatment modalities and the total treatment quality score utilizing the Mann Whitney U test. In this study, a two-tailed Mann Whitney U test with an investigative hypothesis was postulated with a significant level of p=0.05, suggesting that the outcome of this test is a consequence of genuine correlation between the compared groups, i.e. Laser assisted RCT and conventional RCT within a 95% confidence interval.

In Table 3, the null hypothesis is rejected, substantiated by a Z value of -3.571 and a P value of 0.000356. This outcome indicates an observed correlation between treatment modalities and total treatment quality score, in which there is a superior correlation between a laser assisted RCT and total treatment quality score.

Here, Table 4 provides information on the association between age groups and the Total Treatment Quality Score using the Kruskal-Wallis Test, which is a non-parametric test. The Total Treatment Quality Score is being analyzed within three age categories i.e 18-33 with 7 observations, 34-59 with 32 observations and 60-78 with 11 observations. Using Kruskal-Wallis Test, which is a non-parametric alternative to the one-way analysis of variance (ANOVA) and is used to determine if there are statistically significant differences between the groups. The Chi-square value for the Kruskal-Wallis test is provided, which is 9.416 and the associated p-value (Sig.) is 0.009 is less than the significance level of 0.05. Therefore, there is evidence to reject the null hypothesis. Thus, the total treatment quality score is significantly different between at least two of age groups.

5. Discussion

To determine the prognosis in endodontically treated teeth, endodontics has undergone complicated evolution. In 1956, Strindberg outlined the essential criteria for evaluating success of endodontically treated teeth encompassing both clinical and radiographic parameters.[35] Following this, in 2011 a study was conducted by Ng YL et al[36,37] conducted a study where in all the factors affecting the outcomes of non-surgical endodontic treatment were assessed majorly focusing on periapical health of the treated tooth and tooth survival post treatment. Later in 2016,

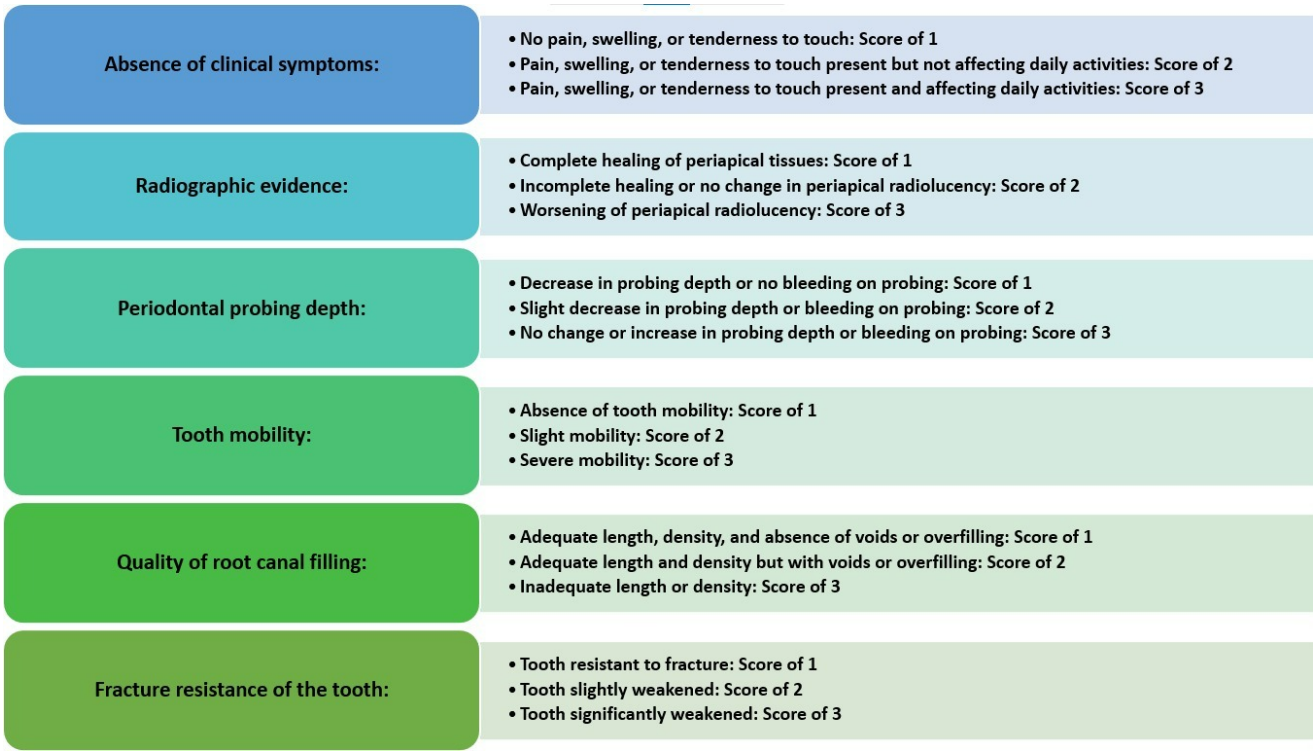

Figure 1: Modified criteria of scoring for outcome assessment of non-surgical endodontic treatment while following Clinician reported outcomes (ClinRo) study protocol based on Nadia Chugal (2017)

Table 1: Descriptive criteria of scoring for outcome assessment of non-surgical endodontic treatment provided by Nadia Chugal (2017)

Scoring	**Absence of Clinical Symptoms:** The absence of clinical symptoms, such as pain, swelling, and tenderness to touch, indicates a successful outcome of the treatment.	**Radiographic Evidence based on Periapical Index:** Radiographs are used to assess the healing of the periapical tissues and the quality of the root canal filling.	**Peridontal Probing Depth:** Periodontal probing depth is used to assess the health of the periodontium surrounding the tooth.	**Tooth Mobility:** Tooth mobility is another parameter that can be used to assess the health of the periodontium.	**Quality of root canal filing:** The quality of the root canal filling, including its length, density, and absence of voids or overfilling, is critical for a successful outcome.	**Fracture resistance of the tooth:** The fracture resistance of the tooth is another criterion that can be used to assess the success of the treatment.	**Patient satisfaction:** Patient satisfaction is an important criterion as it assesses the patient's perception of the treatment outcome.
1	No Pain, Swelling or Tenderness to Touch	Complete healing of periapical tissues	Decrease in Probing depth or no bleeding on probing	Absence of mobility	Adequate Length, density and absence of voids or overfilling	Tooth resistant to fracture	**Very satisfied**
2	Pain, Swelling or tenderness to touch present but not affecting daily activities affecting daily activities	Incomplete healing or no change in periapical radiolucency	Slight decrease in probing depth or bleeding on probing	Slight mobility	Adequate length and density but voids or overfilling	Tooth slightly weakened	**Satisfied**
3	Pain, swelling or tenderness to touch present and affecting daily activities	Worsening of periapical radiolucency	No change or increase in probing depth or bleeding on probing	Severe Mobility	Inadequate length or density	Tooth significantly weakened	**Unsatisfied**

Table 2: Association Between Gender and Total Treatment Quality Score using Mann-Whitney Test. (Non-Parametric Test)

Group Statistics (Mann-Whitney Test)									
	Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**Mean Rank**	**Mann-Whitney Test-Z**	**Asymp. Sig. (2-tailed)**	**p value (2 tailed)**
Total	Male	26	7.3846	1.69887	.33318	27.92	-1.309	**.191**	**.190534**
	Female	24	6.7917	1.10253	.22505	22.88			

Table 3: Association between treatment modalities and total treatment quality score using mann-whitney test (Non-Parametric Test)

Group Statistics (Mann-Whitney Test)									
Total	**Treatment Modalities**	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**Mean Rank**	**Mann-Whitney Test-Z**	**Asymp. Sig. (2-tailed)**	**p value (2-tailed)**
	Laser	25	6.3600	.56862	.11372	18.62	**-3.571**	**.000**	**0.000356**
	Conventional	25	7.8400	1.70000	.34000	32.38			

Table 4: Association between age group and total treatment quality score using kruskal-wallis test (Non-Parametric Test)

Total							
Age Groups	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**Mean Rank**	**Chi-square**	**Sig.**
18-33 Yrs	7	6.0000	.00000	.00000	12.50		
34-59 Yrs	32	7.0625	1.31830	.23304	25.89	9.416	**.009**
60-78 yrs	11	7.9091	1.86840	.56334	32.64		

Bergenholtz stated that during a period of observation post endodontic treatment, endodontic success is achieved as the absence of clinical symptoms and apical periodontitis.[38] In 2016, American Association of Endodontics categorised endodontics outcomes as either functioning, healing, non-healed or healed. A tooth that is "functional, asymptomatic with no or minimal radiographic periradicular pathosis" is said to have healed.[39] (39) Several outcome studies have examined the success of endodontic treatment but, in 2017 when Chugal et al provided us with a scoring criterion which enabled quantification of prognosis of non-surgical endodontic treatment.

Therefore, in the current study is focused on modified criteria of scoring for outcome assessment of non-surgical endodontic treatment as shown in Figure 1, based on the parameters i.e. Absence of clinical symptoms, radiographic evidence, periodontal probing depth, tooth mobility, quality of root canal filling and fracture resistance of the tooth.

In this study, the radiographic analysis focused on two key parameters: periapical lesions and root canal filling quality. The presence, size, and periapical index (PAI) scores of periapical lesions were assessed, while the quality of root canal filling was evaluated based on established criteria.

Periapical lesions occur due to the presence of vital or necrotic tissue inflammation leading to acute or chronic bone resorption. In this study, we have employed RVG digital images instead of the conventional way of diagnosing periapical lesion using intraoral periapical radiographs (IOPA) as RVG digital images need less time and radiation exposure to gain the same diagnostic information, making them superior to IOPA for bone loss identification.[40] This is because digital radiograph imparts a constant addition of millimetres to measurements, while IOPA fails to impart the variation in measuring scales used.[41]

Faraneh et al showed that the success rate of teeth with periapical lesions was 79% in 70 cases which is lower than cases without periapical lesion.[42] In our current study, the evaluation of periapical lesions revealed interesting findings between the two treatment groups. In the conventional RCT group, 12 cases (48%) showed a reduction in lesion size, with a mean decrease in PAI scores from 3 to 2. Additionally, 8 cases (32%) demonstrated complete healing, with PAI scores reaching 1. In the laser assisted RCT group, 19 cases (76%) displayed a reduction in lesion size, with a mean decrease in PAI scores from 3 to 2. Remarkably, 12 cases (48%) achieved complete healing, with PAI scores of 1. These results indicate that both treatment modalities contributed to the reduction and healing of periapical lesions, with laser assisted RCT demonstrating a higher proportion of complete healing cases.

Here, in this study as a part of comparative analysis of radiographic findings provides insights into the prognostic value of laser assisted RCT compared to conventional RCT. The higher proportion of complete healing of periapical lesions in the laser assisted RCT group suggests that this treatment modality may offer enhanced therapeutic efficacy. The reduction in lesion size and improvement in PAI scores observed in both treatment groups indicate the effectiveness of both conventional and laser assisted RCT in managing periapical lesions.

Zhong et al,[43] Santos et al, Song et al have demonstrated an association between the quality of root canal filling and outcome of non-surgical endodontically treated teeth.[44–46]

Initially, no. of roots was used as a unit of measurement for assessment of treatment outcome and has tendency to overestimate success rate. Since, the aim of this study is the comparison of prognostic value of laser assisted RCT and conventional RCT without any confounding factor, the number of roots were excluded. So here in our study the assessment of root canal filling quality also revealed noteworthy outcomes. In the conventional RCT group, 19 cases (76%) showed satisfactory root canal fillings according to the criteria outlined in Figure 1. However, the remaining 6 cases (24%) exhibited suboptimal outcomes, such as voids, overfilled or underfilled canals, or non-uniform filling material distribution. In contrast, the laser assisted RCT group demonstrated improved results, with 21 cases (84%) displaying satisfactory root canal fillings. Only 4 cases (16%) showed suboptimal outcomes. These findings suggest that laser assisted RCT may enhance the quality of root canal fillings, resulting in a higher proportion of satisfactory outcomes.

Traditional lasers, when used inside the root canal have limitations as laser light is emitted in a straight line from the tip of an optical plain-ended fibre or laser guide with divergence angle of only 18-20°, thus it is difficult to gain equal irradiation of entire root canal dentine surface.[47,48] For enhancing irradiation fibre tips with 80% lateral and 20% forward[49] and a helicoidal withdrawing motion from apical to coronal part used fibre tips, therefore providing complete coverage to root canal walls.[50]

Moreover, the improved root canal filling quality observed in the laser assisted RCT group is a significant finding. The higher percentage of cases with satisfactory root canal fillings suggests that laser assistance may facilitate more precise and controlled instrumentation, disinfection, and obturation procedures. This could potentially contribute to better sealing and reduced risk of reinfection, leading to improved long-term treatment outcomes.

Absence of clinical symptoms such as post operative pain, tenderness or swelling is another parameter which is discussed in this study, as it directly impacts the patient's quality of life.[51] As per the literature which frequently associated postoperative pain with bacterial presence.[52] Studies by Yoo et al[53] Mandras et.al[54] Genc et al[55] are concurrent with our research and show there is significant reduction in postoperative pain, when lasers are used as adjunct in non-surgical endodontic procedures.

Therefore, the result of the current research contributes to the expanding amount of evidence supporting the potential benefits of laser assisted RCT in non-surgical endodontic interventions.[56–64] Laser has presented endodontics with distinctive advantages such as reduced invasiveness, enhanced debridement, and heightened disinfecting capabilities. The enhanced prognostic value observed in the laser assisted RCT group has been attributed to this hypothesis, i.e the use of laser as an adjuvant to conventional endodontic surgery leads to a significant further reduction of bacterial load, thus resulting in better prognosis.

It is crucial to acknowledge the inherent limitations of the current study. The retrospective design introduces biases such as selection bias and incomplete data, as modest sample size of 25 cases per treatment modality restricts the generalizability of the findings. Future research is required where a larger sample is employed, and prospective designs are necessary to validate these results. Furthermore, extended follow-up assessments would provide valuable insights into the enduring efficacy and stability of treatment outcomes.

To care for endodontic patients, the current study conducted a comparative analysis of radiographic data, highlighting the prognostic relevance of laser-assisted root canal treatment (RCT) compared with conventional RCT. The outcomes show that both approaches of therapy successfully repair periapical lesions and improve the quality of root canal fillings. When compared to traditional RCT, laser assisted RCT exhibits a greater frequency of full healing cases and better root canal filling results. These results highlight the need for more research and clinical validation and support the use of laser assisted RCT as a feasible option in endodontic therapy.

6. Conclusion

In 2017, Chugal et al developed a scoring criterion which allowed quantification of prognosis for non-surgical endodontic treated teeth while combining newer concepts of healing and functionality. (31) Modification in this criterion was done to fit the clinician reported outcome research design. This study analysed retrospectively collected data comparing the pre and post treatment radiographs to provide important insights into the efficacy of conventional RCT versus laser-assisted RCT. The findings of this study contribute to the growing body of evidence supporting the use of lasers as an adjunct to existing conventional treatment approach in root canal therapy will enhance the prognosis of endodontically treated teeth. This being first of its kind of study, therefore further research and larger-scale studies are warranted to validate these findings and explore other aspects of laser-assisted RCT.

7. Source of Funding

None.

8. Conflict of Interest

None.

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