Working Length Determination in Mandibular Primary Second Molars - A Retrospective Study

Research Article

Godlin Jeneta J[1], Mahesh Ramakrishnan[2*]

[1] Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.
[2] Professor, Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

Abstract

Working length determination is an important step for a successful root canal therapy in deciduous or permanent teeth. The main objective of this study is to evaluate the association between age, gender, tooth number, number of visits with working length of mandibular second primary molar. This was a retrospective, institutional based study. Sample size was 298. Data about patients below 18 years who underwent root canal treatment in the mandibular second primar molar in a period of june 2019 to march 2020 were collected. Excel tabulation was done and data was transferred to SPSS software. T test and pearson correlation was done to compare the age, gender, tooth number, number of visits with working length. $p<0.05$ was considered statistically significant. The mean age of males was 5.59 ± 1.8 and females was 5.68 ± 2.2. The mean working length of males was 12.04 ± 2.8 and females was 12.34 ± 2.8. There was a statistical significant association found between the number of visits and working length. There was no statistical association found between age and working length, gender and working length, tooth number and working length.

Keywords: Mandibular Primary Second Molar; Radiography; Working Length.

Introduction

Successful endodontic treatment in a primary teeth plays an important role in preservation of dentition until the completion of physiologic exfoliation [1]. The primary objective of pulpectomy in deciduous teeth is to retain the teeth in a symptom free state and to maintain the arch form [2].

Determination of root canal working length is considered as one of the most important steps in endodontic treatment [3]. Proper detection working length is important prior to pulpectomy in primary teeth. Working length should be measured from the coronal pont to the site where the root canal ends. The working length should be accurate because it influences the success of the root canal treatment directly [4]. Errors in working length determination may cause the instrument to go beyond the apical foramen causing extravasation of irrigating solutions and restorative materials leading to postoperative pain. In primary tooth, the instrumentation beyond the apex may damage the permanent tooth germ [5].

There are various methods for determining the working length of primary teeth such as tactile sensation method, conventional radiography, radio visiography and the electronic apex locator method [6]. Radiography is the most common techniques followed and widely use for determining the working length [7]. Conventional radiography has been generally used to determine the working length. There are some disadvantages in this method such as superposition of anatomical structures, image distortion and processing time [8]. In radiovisiography method, a sensor is used instead of film which reduces the processing time,has less radiation exposure and allows image editing making it easy to examine the details [9]. The apex locators were developed to determine working length without radiation exposure and has been used for over 40 years [10]. There are various generations of apex locators. Apex locators are gaining popularity nowadays and has been used in permanent teeth in recent years to estimate the working length of the root canal and increase the precision rate of endodontic treatment [11]. Apex locators apart from reducing the unneces-

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sary exposure to radiation has been shown to reduce clinical time. Due to these, its use in primary teeth is recommended [12].

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years [13-31]. With this inspiration we planned to pursue research on the working length determination in mandibular primary second molars.

The objective of this study is to determine the working length of the mandibular primary second molars and associate it with age, gender and tooth number.

Materials and Methods

The study was in a University setting. Study includes patients who underwent crown lengthening in the anterior region (aesthetic zone). Sample size is 243. The study was a retrospective unicentric observational study. Ethical approval from university ethics committee. Data was collected from DIAS where the dental and medical history of the patients were recorded. The data tabulation done in excel sheet and transferred to SPSS for data analysis. Chi-square test was done.

Study Design

This was a retrospective study conducted in a private dental institution. The patient case records were reviewed for the necessary information by a trained examiner. The advantage of conducting the study in an institutional set up provides easy access to patient records. Among patients who have visited the dental clinic of the institution, the information of 243 teeth was reviewed. A age range of under 18 was selected for the study. The institutional ethical committee provided approval for the study (SDC/SIHEC/2020/DIASDATA/0619-0320).

Inclusion criteria

1. Patients who had undergone pulpectomy in mandibular primary second molars
2. Patients from below 18 years of age

Exclusion criteria

1. Incomplete patient data
2. Duplicate patient data
3. Pulpectomy in other primary teeth other than mandibular primary second molars.

Sampling

A total of 243 tooth sites of patients who underwent pulp therapy were reviewed for the tooth number, age, working length and gender. Convenient sampling method was used to select the patients for the study. The data obtained from the case records were cross verified with photographs.

Data collection

All the data after thorough checking for duplicates, incomplete entries and cross verification with photographs were entered in Microsoft excel spread sheet in order to organise the data. The variables obtained from the data included age, gender, arch, and reason for crown lengthening. Here the age, gender, tooth number are the independent variables and , working length is the dependent variable.

Statistics

The statistical analysis of the obtained data was performed by the SPSS software version 23.0. The data from the excel spreadsheet was transferred to SPSS software for analysis. Chi square tests were employed in order to find the association between different variables. The p value less than 5% was considered statistically significant. The final results are presented in the form of graphs for further interpretation and discussion.

Results and Discussion

One of the most important steps for successful pulp therapy is to determine the working length accurately. Working length determination plays an important role to avoid possible damage to the underlying permanent teeth bud, periradicular tissue injury or infection due to over instrumentation [32]. There are not much studies on the working length of primary mandibular second molars.

A total of 243 mandibular second primary molars were included in this study. All these are root canal treated teeth. The mean age of the boys and girls were 5.59 ± 1.8 and 5.68 ± 2.2 respectively. The mean working length of boys and girls were 12.04 ± 2.8 and 12.34 ± 2.8 respectively. A study by Koruyucu stated that the working length of primary teeth present in the lower jaw is 12.73 ± 1.76 [7].

The distribution of age and the working length were studied in that individuals below 5 years had 16.46% of teeth with working length less than 10 and 37.45% of teeth with working length between 11 to 20. Individuals of age group 5 to 10 had 12.35% of teeth with working length less than 10, 32.10% of teeth with working length between 11 to 20 and 0.41% of teeth above 21. Individuals of age group above 11 had 0.41% of teeth with working length less than 10, 0.82% of teeth with working length between 11 to 20. There was no statistically significant association found (p=0.471). However, working length of 11 to 20 was more prevalent below 5 years. (Figure 1)

The distribution of tooth number and the working length were studied in that the mandibular left second primary molar had 16.05% of teeth with working length below 10, 32.92% of teeth with working length between 11 and 20, 0.41% of teeth with working length above 21. Mandibular right second primary molar had 13.17% of teeth with working length below 10 and 37.45% of teeth with working length between 11 and 20. There was no statistically significant association found (p=0.307). However, working length of 11 to 20 was more prevalent in 85. (Figure 2)

The distribution of gender and the working length were studied in that males had 17.28% of teeth with working length below 10 and 39.51% of teeth with working length between 11 and 20. Females had 11.93% of teeth with working length below 10, 30.86% of teeth with working length between 11 and 20, 0.41% of teeth with working length above 21. There was no statistically signifi-

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Figure 1. Depicts the association between the age and the working length. X axis represents the age and Y axis represents the total number pulpectomy done in mandibular second molars. From the present graph it can be inferred that the association between the variables is statistically not significant (p value=0.471; p > 0.05). However, working length of 11 to 20 was more prevalent below 5 years and between 6 to 10 years.
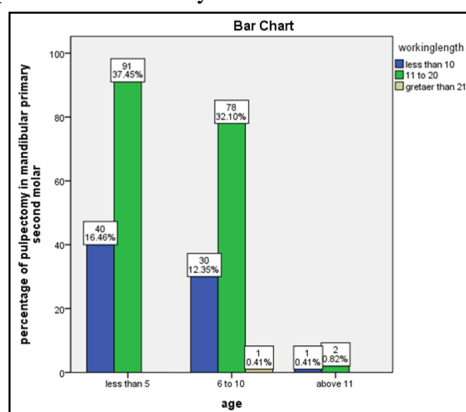

Figure 2. Depicts the association between the tooth number and the working length. X axis represents the tooth number and Y axis represents the total number pulpectomy done in mandibular second molars. From the present graph it can be inferred that the association between the variables is statistically not significant (p value=0.307; p > 0.05). However, working length of 11 to 20 was more prevalent in 85.
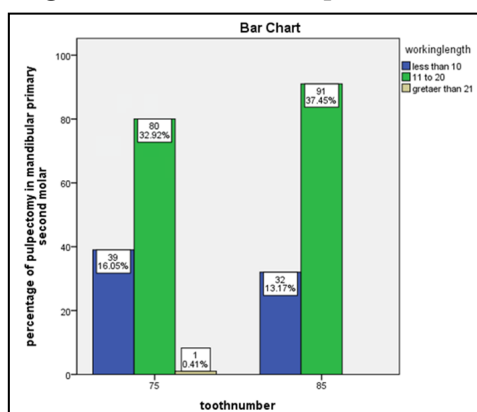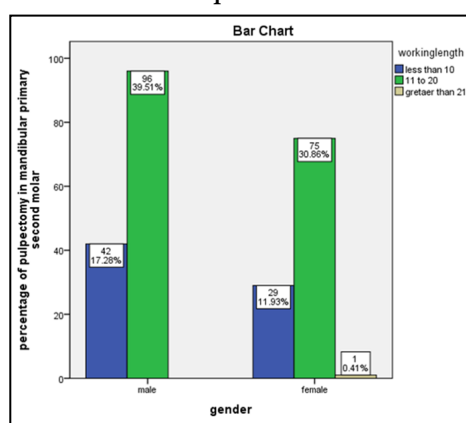

Figure 3. Depicts the association between the gender and the working length. X axis represents the gender and Y axis represents the total number pulpectomy done in mandibular second molars. From the present graph it can be inferred that the association between the variables is statistically not significant (p value=0.471; p > 0.05). However, working length of 11 to 20 was more prevalent in males.
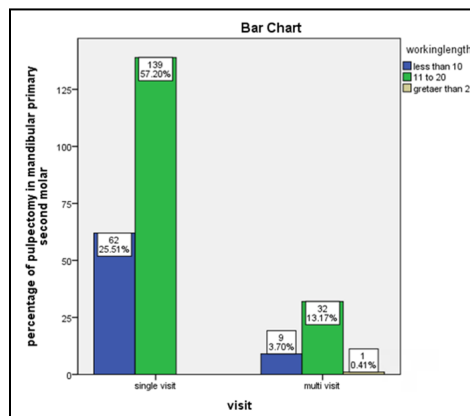

cant association found (p=0.471). However, working length of 11 to 20 was more prevalent in males. (Figure 3)

The distribution of number of visits and the working length were studied in that single visit had 25.51% of teeth with working length below 10 and 57.20% of teeth with working length between 11 and 20. Multi visits had 3.70% of teeth with working length below 10, 13.17% of teeth with working length between 11 and 20, 0.41% of teeth with working length above 21. Statisti-

cal significance was found between number of visits and working length (p=0.048). Working length of 11 to 20 was more prevalent in single visits. (Figure 4)

Limitations of this study include small sample size and subjective bias. Future study should be conducted with a wide range of population.

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Figure 4. Depicts the association between the number of visits and the working length. X axis represents the number of visits and Y axis represents the total number pulpectomy done in mandibular second molars. From the present graph it can be inferred that the association between the variables is statistically significant (p value=0.048; p < 0.05).

Conclusion

Within the limitation of the study, we can conclude that there is a significant difference between the number of visits and working length. There was no statistical significance found between age and working length, gender and working length, tooth number and working length. Working length of 11 to 20 was more prevalent than working length less than 10 or above 21.

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