LUX MENSANA **Volume 1, Issue 3, 2022**
Page. 127- 132

Original Research Article

Radiograph Evaluation Of Root Canal Treatment Using Periapical Index, Strindberg's Criteria and Molven's Criteria

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ABSTRACT

Introduction. Periapical disease can be treated by endodontic treatment. One way to evaluate the success of the root canal treatment is operating the treatment radiographically used Periapical Index, Strindberg's Criteria dan Molven's Criteria. Along with the development of technology, one of the tools that can be used is Computed Radiography. This tool is used to detect abnormalities and periapical healing process. Evaluating the success of root canal treatment using Computed Radiography with Periapical Index, Strindberg's Criteria and Molven's Criteria. **Methods.** The research sample is computed radiography data at Academic Dental Hospital within a total of 48 samples of single root canal teeth. The observation was observed by two observers through the google form link, before and after root canal treatment according to the criteria. The final results of this research were analyzed using Kappa Test, Kruskal Wallis Non-Parametric Test and Mann Whitney Post Hoc Test. **Results & Analysis.** The kappa or agreement value of the assessment was higher on the Strindberg's Criteria with a fairly high interpretation compared to the Periapical Index and Molven's Criteria, both of which only scored moderately. There are different assessments when using different types of assessment on the Periapical Index and Strindberg's Criteria. **Discussion.** There are different assessments when using different types of assessment on the Periapical Index and Strindberg's Criteria. Agreement value of the assessment was higher on the Strindberg's Criteria with a fairly high interpretation.

Keywords: Molven's Criteria, Periapical Index, Periapical Status, Strindberg's Criteria.

INTRODUCTION

Periapical disease can be treated by treating the root canal treatment (Fitriandari, Pramanik and Adang, 2018). Accomplishment in treating the root canal treatment with periapical lesions requires evaluation for 2-6 years. Evaluation can be conducted clinically, radiographically and histopathological (Estrela *et al.*, 2014). The most frequently used observations in evaluating endodontic success are clinical and radiographic observations (Mandojo Rukmo, 2011).

The radiographic approach is usually one of process in determining

disease conditions and planning appropriate treatment in dentistry (Gail Williamson, 2006). Radiographic features have an important role in establishing a diagnosis before treatment, during treatment and evaluating the results of treatment then it requires appropriate radiographic techniques (Margono G, 1998). The operator must be able to understand the purpose of dental radiography and its criteria in order to evaluate the quality of process, then radiographs are only managed when there is a required diagnostic to obtain the information that the radiograph may provide (Sanjay Mallya, 2018).

Radiographic technology for dentistry has developed from conventional film-based radiography to modern radiography without film, that is computed radiography system (Susilo *et al.*, 2014). Computed radiography is photograph digitization process using Photostimulable Phosphor Plate as IP (Imaging Plate) (Fahmi A, Firdausi KS, 2008). Computed radiography can provide better black-white radiographic images than SF (Screen Film) units in conventional radiography systems (Jorge *et al.*, 2008).

Periapical radiographic evaluation is the most used method for detecting periapical lesions, however it has the disadvantage, that is, it only provides 2D images of 3D structures which limits information regarding bone thickness, root canal anatomy, size and location of periapical lesions. Periapical radiographs only provide acceptable detail in the mesiodistal area and visualization of detail in the buccolingual area is inadequate (Gupta *et al.*, 2014). Periapical radiographs are generally used as intraoral radiographs to observe periapical tissues because it provides the important information about teeth and surrounding bone tissue and it must be clear in showing all parts of the tooth including bone (Yaghooti Khorasani and Ebrahimnejad, 2017). Periapical radiographs can also find out the change in tissue or organs, it is because routine histological examinations cannot be carried out in evaluating the success of endodontic treatment (Fitriandari, Pramanik and Adang, 2018). Based on these problems, the researcher is be able to observe an accomplishment in treating the root canal treatment with periapical lesions used computed radiography regarding to three criteria of periapical status.

METHOD AND ANALYSIS

This research is an analytic observational with a cross sectional research design using dental data carried

out in root canal treatment and it observed by two observers through the google form link. The research sample is computed radiography data with a total of 48 samples of single root canal teeth which taken from web.endo-radiograf.evaluation.com. Data that has been collected it then input them into Google Form, after that, assessing use Periapical Index, Strindberg's Criteria and Molven's Criteria on radiographs before and after root canal treatment. Furthermore, the data is processed to determine the Kappa value with a non-parametric test from the Kruskal Wallis method and it is continued using the Mann Whitney Post Hoc Test.

The data collection technique used is direct interviews with research respondents by asking a list of questions that have been compiled in the questionnaire and choosing alternative answers that already exist. Data analysis using *statistical software application.*

Figure 1. Radiograph before treatment

Figure 2. Radiograph after treatment

Figure 2.1. Radiograph after Evaluation

RESULTS

The assessment data of periapical status processed using Kappa Test and it obtained as the following results:

Table 1. Kappa Test Result

	Pra	**Pasca**
Periapical Index	0,290	0,223
Strindberg's System	0,406	0,429
Molven's Criteria	0,332	0,337

Based on Kappa Test table above, it showed that the agreement of the assessments which conducted by two observers is higher on the Strindberg's Criteria than the other two scoring indexs.

Kruskal Wallis Test

The results of the research data were analyzed by Kruskal Wallis method using SPSS. It is used to determine the distinction of periapical status assessment result using three different types of indices, there are the Periapical Index, Strindberg's Criteria and Molven's Criteria such as the following table below:

Table 2. Kappa Test Result

	Asymp.Sig.
1st Observer	0,048
2nd Observer	0,703

Based on Table 2 there is a significant distinction of (P<0,05) on the first observer.

Post Hoc Test of Mann Whitney

According to significance value of first observer which indicated the distinction, then it can be conducted Post Hoc Test of Mann Whitney as following on the Table 3 below:

Table 3. Post Hoc Test

	Asymp.Sig.
Periapical Index - Strindberg's System	0,017
Strindberg's System - Molven's Criteria	0,212
Periapical Index - Molven's Criteria	0,184

The result of the table above indicated that the significance value on the Periapical Index-Strindberg's System is 0.017 which a significance (P<0.05) and it means that there is a difference between the types of Periapical Index and Strindberg's Criteria assessments.

DISCUSSION

This research obtained the distinction of Kappa value on each periapical status assessment index used, it caused of some factors, such as radiograph result quality, the distinction in interpretation between observers, and the distinction of assessment categories total in each index.

In dentistry, especially in the endodontics field, radiographs are needed to establish a diagnosis to the stage in evaluating of the treatment succeed. The conventional radiography or computed radiograph become frequently used options by dentists. The research result indicated that there is no significant difference between conventional radiographs and computed radiographs in the accuracy of radiographs. Nowadays, computed radiographs have been mostly chosen than conventional radiographs because of the smaller radiation dose and less time consuming to produce (Yaghooti Khorasani and Ebrahimnejad, 2017). This statement is strengthened by a statement from Abarajithan *et al*, (2013), they stated that computed radiograph more modern than conventional radiography. Due to the smaller radiation exposure, computed radiographs are also considered more in modifying and transmitting.

Radiographic checkup is considered very useful in determining the diagnosis, treatment and development of the results of the treatment. Based on the disease or condition of lesions in the oral

cavity, especially periapical lesions, good ability is needed to interpret radiographic results. There are at least 60-70% of dentists who have appropriateness and consistency in alyzing radiographs so that it is necessary to compare radiographs from previous checkup with after checkup. It is conducted to help the dentist in finding out of the periapical status after treatment and take an action to accelerate the development or growth of the lesion if the treatment is not successful (Supriyadi s, 2015).

In recent years, the Periapical Index is increasingly being used because it can assess various levels of inflammation in endodontic cases. Endodontic treatment aims to prevent or treat periapical lesions, then periodic assessment of periapical status is needed, that is before treatment and after treatment to predict the periapical status in the future (Kirkevang *et al.,* 2015). The assessment of periapical conditions using the Periapical Index on radiographic images allows better in interpreting of radiographs because it can detect periapical abnormalities and the healing process. The first and second Periapical Index value mean as a healthy condition or there is a little bit of inflammation, meanwhile for third until fifth value mean as unsafe condition or it will be able an illness. Unfortunately, the assessment result used Periapical Index is subjective, which the result is quite susceptible to change due to differences in results from observers (Trope, Delano and Ørstavik, 1999).

CONCLUSION

There are differences of periapical status assessment result between Periapical Index, Strindberg's Criteria dan Molven's Criteria. Agreement value of the assessment was higher on the Strindberg's Criteria with a fairly high interpretation compared to the Periapical Index and Molven's Criteria.

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