



A retrospective study of periapical microsurgery outcome

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Abstract

Background: This study was conducted to assess the outcome of periapical microsurgery.

Material and methods: The patients who underwent periapical microsurgery were recruited. The outcomes had been evaluated clinically as well as radiographically, at least a year following the endodontic microsurgery, with a recall period. Using Image J software, photos were scanned and analysed to determine the sizes of the periapical radiolucency. Modified Friedman's criteria had been applied to classify the outcome as healed, healing, or disease. Pre-operative, intra-operative, as well as post-operative factors had been taken into account, as well as analysed using logistic regression in attempt to recognize any significant factors.

Results: According to Cohen's kappa value of 0.75, there was almost complete agreement. 100 patients' teeth had endodontic microsurgery on a total of 150. The investigation was omitted 50 teeth. Of them, 30 teeth were omitted because the radiography data was insufficient, 15 teeth were left out because they had been recalled for less than a year, and five teeth had vertical root fractures that were discovered during surgery. The attending samples of 100 teeth had an average recall length of 28.7 months and a recall rate of seventy-one percent. Out of 100 teeth evaluated, 64 (or 64%) were healed, 26 (or 26%) were healing, and 10 (or 10%) were unhealthy.

Conclusion: The healed rate in the current study was 64%.

Keywords: periapical surgery, outcome, prognostic factors

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Introduction

Currently, the success of periapical microsurgery is determined by the restoration of the lamina dura and the elimination of symptoms. However, inadequate site preservation may prevent later implant placement. Although not possible before, the advent of cone-beam computed tomographic imaging and computer-aided registration allows for indirect and accurate 3-dimensional analysis of the surgical site over time.¹

When a radiopaque periapical lesion measures over 8 to 10 mm in diameter and it is a suspected periapical cyst, endodontic surgery is required to remove the cyst and a biopsy is needed to confirm histologic diagnosis of the lesion.^{2,3}

A most commonly performed endodontic surgery usually involves exposure of the periapical lesion through an osteotomy, surgical removal of the lesion, removal of part of the root-end tip [3]. However, the root-end surface sometimes can be difficult to distinguish from the surrounding osseous tissues.⁴

In such cases, conventionally, the approximate location of the root-end may be estimated using preoperative radiographs. The method of locating the root apex is to first locate the body of the root substantially coronal to the apex, where the bone covering the root is thinner. Once the root has been located and identified, the bone covering the root is slowly and carefully removed, working in an apical direction until the root apex is identified.⁵

Hence, this study was conducted to assess the outcome of periapical microsurgery.

Material and methods

All of the subjects who were involved in the study had received endodontic microsurgery treatment by endodontic professors or postgraduate students. Under a dental operating microscope, a surgical procedure was carried out under various magnification and lighting circumstances. Ultrasonic retropreparation tips as well as microinstruments like micromirrors and micropluggers were employed. Apicoectomy or apicoectomy with root-end filling with super EBA or MTA were the root-end preparation procedures. A recall span of at least a year, thorough documentation of clinical data and therapeutic methods, and high-quality radiographs were other prerequisites.

gencalculate the size of the periapical lesions, the pre-operative, post-operative, as well as recall radiographs have been uploaded into Image J Software. The radiographs' horizontal angles were also adjusted using the TurboReg plugin program prior to measurement. In a two-week period, 20 radiographic scans were chosen at random as well as blindly evaluated

according to Molven's standards by one researcher. Cohen's kappa coefficient test was used to evaluate intra-examiner reliability. Data from the outcomes, which were divided into healed, healing, as well as diseased categories, were described using descriptive analysis.

Results

Table 1: Numbers of teeth and percentages of outcomes of endodontic microsurgery.

Outcomes	Number of teeth	Percentage
Healed	64	64%
Healing	26	26%
Diseased	10	10%
Total	100	100%

According to Cohen's kappa value of 0.75, there was almost complete agreement. 100 patients' teeth had endodontic microsurgery on a total of 150. The investigation was omitted 50 teeth. Of them, 30 teeth were omitted because the radiography data was insufficient, 15 teeth were left out because they had been recalled for less than a year, and five teeth had vertical root fractures that were discovered during surgery. The attending samples of 100 teeth had an average recall length of 28.7 months and a recall rate of seventy-one percent. Out of 100 teeth evaluated, 64 (or 64%) were healed, 26 (or 26%) were healing, and 10 (or 10%) were unhealthy.

Table 2: Gender-wise distribution of the participants.

Gender	Number of participants	Percentage
Males	35	35%
Females	65	65%
Total	100	100%

There were 35 males and 65 females in this study.

Table 3: Prevalence of signs and symptoms.

Prevalence	Number of teeth	Percentage
Absent	26	26%
Present	74	74%
Total	100	100%

Out of 100 teeth, signs and symptoms were seen in 74% of teeth.

Table 4: Assessment of mobility of teeth.

Mobility	Number of teeth	Percentage
Absent	69	69%
Present	31	31%
Total	100	100%

Mobility was observed in 69 teeth out of 100 teeth.

Table 5: Periodontal involvement.

Periodontal involvement	Number of teeth	Percentage
Absent	91	91%
Present	09	09%
Total	100	100%

9 out of 100 teeth showed periodontal involvement.

It was also observed that 7 out of 100 teeth had undergone periapical surgery previously. The lesion size was greater than 5mm in 49 out of 100 teeth examined.

Discussion

Endodontic treatment is usually performed in teeth with periapical lesions. However, in some cases the pathology persists. Thus, periapical surgery has to be performed. It is considered to be the last treatment option before the extraction of a tooth. The main objective of periapical surgery is to seal the root canal system, thereby enabling healing by forming a barrier between the irritants within the confines of the affected root and the periapical tissue. The success of periapical surgery is usually determined by both radiological signs and clinical signs and symptoms.^{7,8} Apical surgery has been a procedure that is resorted as the last option before tooth extraction with unpredictable outcomes. Today, apical surgery has advanced to become a modern technique which has good results with regard to treatment of endodontic lesions with predictable healing patterns.⁹ Hence, the current study was carried out to assess the outcome of periapical microsurgery.

In this study, according to Cohen's kappa value of 0.75, there was almost complete agreement. 100 patients' teeth had endodontic microsurgery on a total of 150. The investigation was omitted 50 teeth. Of them, 30 teeth were omitted because the radiography data was insufficient, 15 teeth were left out because they had been recalled for less than a year, and five teeth had vertical root fractures that were discovered during surgery. The

attending samples of 100 teeth had an average recall length of 28.7 months and a recall rate of seventy-one percent. Out of 100 teeth evaluated, 64 (or 64%) were healed, 26 (or 26%) were healing, and 10 (or 10%) were unhealthy. There were 35 males and 65 females in this study. Out of 100 teeth, signs and symptoms were seen in 74% of teeth. Mobility was observed in 69 teeth out of 100 teeth. 9 out of 100 teeth showed periodontal involvement. It was also observed that 7 out of 100 teeth had undergone periapical surgery previously. The lesion size was greater than 5mm in 49 out of 100 teeth examined.

Song et al.¹⁰ stated that the outcome of the apical surgery is not influenced by preoperative signs and symptoms. Von Arx et al.⁷ reported that pain and tenderness at the initial examination were shown to be effective only in the 1-year prognosis after apical surgery; however, after 5-year follow-up these findings lost their prognostic value.¹¹

Polpalangkul T et al.¹² evaluated treatment outcomes and prognostic factors on the success of periapical microsurgery. Patients who were treated with periapical microsurgery at Endodontic Clinic of Dental Hospital and Endodontic Clinic of Golden Jubilee Medical Center, Faculty of Dentistry, Mahidol University, Thailand, from January 2005 to December 2015, were recruited. The outcomes were assessed clinically and radiographically with a recall period of at least one year after the endodontic microsurgery. All radiographic images were scanned and analysed using Image J software, to measure sizes of periapical radiolucency. Modified Friedman's criteria was employed to classify the outcome as healed, healing, or disease. Pre-operative, intra-operative, and post-operative factors were taken into consideration, and analysed using logistic regression in order to identify any significant factors. Of all 175 teeth in 154 patients, one-hundred and twenty-nine teeth were recruited. The recall rate was 83.7% (108 teeth) with a mean recall period of 30.8 months (ranging from 12 to 108 months). The outcomes were 86 teeth healed (79.6%), 20 teeth healing (18.5%) and 2 teeth diseased (1.9%). Multivariate logistic regression analysis showed that quality of the pre-operative root canal filling was a significant prognostic factor ($P \leq 0.05$). Teeth with inadequate root canal fillings had six times higher chance of 'disease' than teeth with adequate quality fillings. The healed rate in this study was 79.6%. Inadequate quality of pre-operative root canal filling was the significant negative prognostic factor of the outcomes.

Gagliani et al.¹³, and von Arx et al.¹⁴ reported lower resurgery success because resurgery was performed in the negative cases in which surgery had failed previously and may have different aetiologies that delay the healing

Conclusion

The outcomes of this study were 64% healed, 26% healing, and 10% diseased.

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