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Age-Related Differences in Root Migration and Lesion Formation After Third-Molar Coronectomy

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Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCD 1 Ahmet Can Haskan
ABCDE 1 Fariz Selimli
DEF 2 Osman Fatih Arpağ
EF 1 Muhammed Said Altun

1 Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Hatay Mustafa Kemal University, Hatay, Türkiye
2 Department of Periodontology, Faculty of Dentistry, Hatay Mustafa Kemal University, Hatay, Türkiye

Corresponding Author: Osman Fatih Arpağ, e-mail: ofarpag@mku.edu.tr
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Background: Surgical extraction of third molars related to the inferior alveolar nerve can cause paraesthesia. With coronectomy, the full extraction can be achieved without complications or with minimal complications. The present study aimed to compare the amount of eruption and the parameters of edema, interincisal clearance, and pain in coronectomy procedures performed in patient in different age groups and to evaluate the development of endodontic lesion.

Material/Methods: Seventy-three patients aged 18-55 years were included in the study. The patients were divided into 2 age groups: 18-30 years (n=40) and 31-55 years (n=33). After performing the coronectomy, the roots were left in place. Interincisal opening, percentage of edema, and pain scores were recorded preoperatively and on the 3rd and 7th postoperative days. Panoramic radiographs were taken at 6 months to assess root migration.

Results: The distance of interincisal opening and the percentage of edema on the 3rd day were lower in the 18-30 age group ($P<0.001$). In both 2 groups, interincisal opening and percentage of edema on the 7th day were close to the preoperative values ($P>0.05$). In the 18-30 age group, the pain scores on the 3rd and 7th days were higher ($P<0.001$). Root migration in the 18-30 age group was 2.50±0.42 mm and 2.26±0.56 mm in the 31-55 age group. No significant difference was found between the 2 groups ($P=0.288$). There was no endodontic lesion formation detected during the 6-month follow-up.

Conclusions: Coronectomy is a practicable approach for mesio-angular impacted third molars in close proximity to inferior alveolar nerve (IAN) in individuals aged 18-55 years old.

Keywords: Age Factors • Oral Surgical Procedures • Postoperative Complications

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Introduction

The surgical removal of impacted teeth is a very common procedure in dental surgery [1]. The rate of impacted lower third molars is high, and their extraction may require surgical intervention if there are appropriate indications for the mandibular region [2]. During these surgical procedures, local trauma can lead to pain, edema, trismus, or local complications postoperatively [3]. These complications significantly reduce patient comfort during the recovery phase. Non-traumatic surgical approaches and proper postoperative care can often alleviate problems [4]. Various medical and conservative surgical interventions have been introduced to reduce local complications following impacted lower third-molar surgery, such as pain, edema, and trismus [5].

The roots of impacted lower third molars may be associated with the inferior alveolar nerve (IAN). In some cases, the IAN can pass through the buccal or lingual side of the impacted tooth or be positioned between the roots. In cases in which the IAN has a known relationship with a lower third molar, removing the complete tooth can cause temporary or permanent numbness in areas stimulated by the IAN, particularly in the lip and buccal mucosa [6]. A recent meta-analysis reported that the rate of IAN damage due to extraction of mandibular third molars in close proximity to the IAN varies between 0.4% and 9% [7]. To mitigate this risk and reduce patient trauma, a conservative approach involving removal of the problematic crown portion and leaving the root may be adopted. This procedure, called coronectomy, was introduced by Knutsson et al [8], and has been preferred by many surgeons [9,10]. In an earlier study by the present authors, it was found that the roots tend to migrate forwards during the early postoperative period [11]. However, some studies have analyzed the migration of the remnant roots, and found that their migration pattern may be affected by factors such as patient age, sex, impaction depth, angulation, and eruption status [12,13].

Coronectomy is typically performed on vertically, mesially, or distally inclined mandibular third molars in which the crown section does not indicate an increased risk of nerve injury. However, it can also be used on severely impacted mandibular second molars or even mandibular first molars [4]. This technique is recommended for patients aged 25 years and older who are at moderate or high risk of IAN injury during complete third-molar extraction and do not accept the possibility of nerve injury. Coronectomy may also be indicated in special circumstances for patients aged 25 years and older who are at low risk of IAN injury, such as wind instrument players [14].

Coronectomy has several contraindications. These include caries or infection involving the root of the tooth, the inability to remove all the enamel from the tooth, the need of distalize the second lower molar for orthodontic treatment, the risk of the movement of the root remnant and it acting as a foreign body, and horizontally impacted teeth along the nerve pathway due to the increased risk during crown trimming [15]. Coronectomy should also not be performed in patients receiving chemotherapy or radiotherapy, immunosuppressed patients, or those with uncontrolled diabetes [15].

In older adults, cellular aging increases significantly due to increased oxidative stress and changes in bone metabolism [16,17]. Geyikli et al compared antioxidant and inflammation levels in individuals who were 20-30 years old and those who were 31-50 ones. They found that total antioxidant levels and biochemical enzyme activity were significantly lower in individuals ages 20-30 years. Thus, their study showed that oxidative stress increases with age and that immune response decreases [18]. Another study showed that gingival epithelium thinning, increased permeability to bacterial antigens, decreased functional trauma resistance, and alveolar bone atrophy were 50% higher in individuals aged over 30 years [19].

There are periods in human life during which physiological changes are important. In light of the above-mentioned studies, our hypothesis in the present study was that the coronectomy procedure in older patients will not show the expected effect on migration of the remaining roots due to the slowing of physiological processes. Therefore, this study aimed to evaluate the effects of age on root migration after coronectomy of the lower third-molar tooth in 73 patients aged 18-55 years.

Material and Methods

The Hatay Mustafa Kemal University, Clinical Research Ethics Committee approved the protocol (2022/49), and the study was conducted according to the Helsinki Declaration of 1975, as revised in 2013. This prospective cohort study was conducted at Hatay Mustafa Kemal University's Department of Oral and Maxillofacial Surgery. All patients were informed about the study, including the clinical procedures involved, and all provided written consent.

Patient Selection

Inclusion and Exclusion Criteria

The study included 73 patients aged 18-55 years. Patients who were systemically healthy and had impacted lower third molars (only for mesio-angular-positioned teeth) related to the IAN were included in the study. Moreover, radiographic criteria for IAN-related teeth were used for the inclusion as follows (the so-called Rood's criteria): alteration of the root structure (darkening, deflection, narrowing, or overlapping over the inferior

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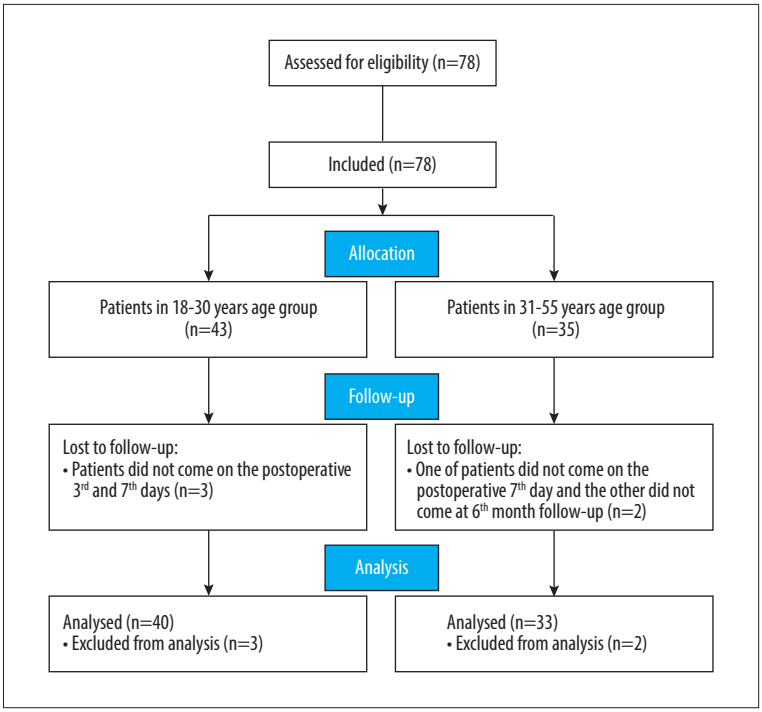


Figure 1. Flowchart diagram of the study.

alveolar nerve canal), and in the features of the inferior alveolar canal (the obliteration of radiopaque line or deflection or narrowing of the nerve canal) [20].

Patients who had caries, pulpal and endodontic lesions in the impacted molar, poor oral hygiene, drug allergies, used tobacco or drugs, and/or were pregnant were excluded from this study. The decision between coronectomy and complete surgical removal was made by an experienced oral and maxillofacial surgeon, followed by assessment by an independent radiologist. The surgeon made the final choice in this regard and performed the surgical procedure selected.

Patient Allocation

A total of 78 patients were initially included in the study, but 5 patients were excluded due to their failure to attend regular follow-up visits, resulting in a final analysis of 73 patients (**Figure 1**). These patients were divided into 2 age groups: the first group consisted of 17 males and 23 females aged 18-30 years, while the second group consisted of 17 males and 16 females aged 31-55.

Surgical Procedure

All surgical procedures were performed by a surgeon experienced in the field. The IAN and buccal nerve were blocked with anaesthetic solution **(**2% lidocaine with 1: 100 000 epinephrine**).** A triangular flap technique was performed with a blade. After elevating the flap, the bone overlying the impacted tooth was removed using a round bur to fully visualize the tooth's crown. The revealed crown was cut at the enamel–cement line using a carbide-fissure bur at 20 000 rpm, and the remaining roots were reduced to at least 2 mm below the alveolar crest with a diamond round bur integrated into the handpiece of the motor (NSK Surgic Pro, Nakanishi, Inc., Tochigi, Japan). The preparation was completed without leaving any sharp edges, and the crown was removed. The exposed pulp was washed with sterile saline without any further intervention. The surgical area was sutured using 5/0 silk (Silk, Dogsan Corp., Trabzon, Türkiye). Analgesic (25 mg of dexketoprofen trometamol) and antibiotic drugs (125 mg of clavulanic acid and 875 mg of amoxicillin) were administered twice a day.

Clinical Measurements

Callipers were used to obtain the clinical parameters including the edema and interincisal opening. Interincisal opening was measured preoperatively and on the 3rd and 7th postoperative days for comparison with the preoperative period. The interincisal opening was measured in patients within the same group to assess limitations regarding mouth opening. The interincisal opening was measured using a calliper (Iwanson Calliper, Medesy, Italy) between the maxillary and mandibular central incisors in the midline, as described by Wood and Branco [21]. Before measuring the interincisal opening, the patients were asked to rest for at least 10 minutes. The interincisal opening was measured for each patient in the Frankfort horizontal plane, which was oriented parallel to the floor, according to the natural head position. The patients were asked to open

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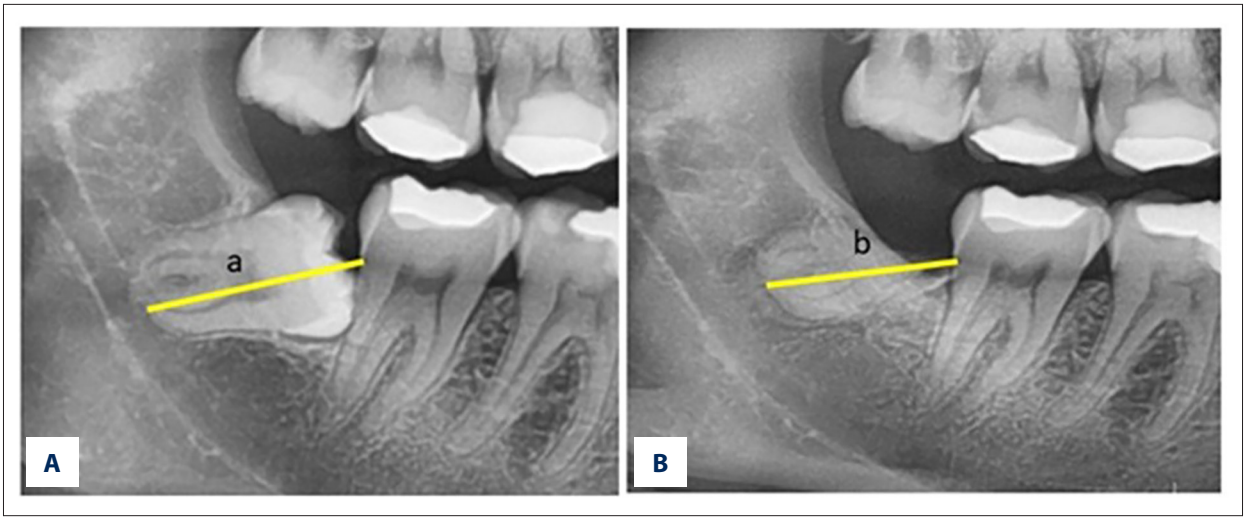


Figure 2. (**A**) Preoperative radiographic view. Measurement of root migration distance (a-b. a; distance to mesial root apex of impacted tooth from cementum-enamel junction of adjacent tooth before coronectomy, b; distance to mesial root apex of impacted tooth from cementum-enamel junction of adjacent tooth after coronectomy). (**B**) radiographic view of postoperative sixth month.

their mouths as wide as they could without causing pain. The linear distance from the incisal edge of the upper central incisor to the incisal edge of the lower central incisor was recorded. Each patient was measured 3 times every 2 minutes, and the highest value of these 3 measurements was recorded.

Swelling (edema) was evaluated by measuring the goniongnathion, tragus-commissure, and lateral canthus of the eye-mandibular angle distances. This approach was intended to determine how swelling varies with age. Swelling was measured by assessing the distances between anatomical reference points. To determine the amount of swelling, the following calculations were used:

Facial distance = lateral canthus of the eye-mandibular angle + tragus-commissure + tragus–soft tissue pogonion)/3.

Swelling percentage = postoperative facial distance - preoperative facial distance) / preoperative facial distance×100.

All measurements were performed by a trained individual who was blinded to the study protocol. Postoperative measurements on the 3rd and 7th days were compared to the preoperative values proportionally.

Pain Assessment and Endodontic Lesion Formation

Pain level was determined by using a 10-cm visual analogue scale (VAS) with patients providing ratings before the operation and on the 3rd and 7th postoperative days. The VAS typically consists of a 10-cm (it may also be labelled using 100 mm). This line may be either horizontal or vertical, with endpoints labelled “no pain” and “unbearable pain”, and patients mark their pain levels along this line [22]. Moreover, the formation of endodontic lesions was assessed 6 months after coronectomy.

Root Migration

Root migration was measured by 2 independent, experienced examiners to determine the reliability of the measurements. These examiners used calibrated panoramic radiographs taken with an X-ray device (Vatech Pax-iCo., Hwaseong, Korea), using exposures with the parameters of 70 kVp, 10 mA, and 9.7 s exposure time. All image processing and analysis procedures were performed by 1 dento-maxillofacial radiologist. All measurements were taken simultaneously on the same laptop to rule out changes in image resolution (Dell, Inc., Round Rock, TX, USA). Image manipulation using the development tools of the tracer solution (magnification, contrast, and brightness) was not allowed. To obtain panoramic radiography in accordance with the appropriate standards, patients should be positioned in the so-called ski position. In this position, the patient holds the shoulders and neck upright by joining the feet forward and stretching slightly backward. In addition, the head should be positioned according to the Frankfurt horizontal plane, the jaw should be placed in the focal trough, the tongue should be moved to the palate and the patient should hold still. The distance from the most distal point of the cement enamel junction of the adjacent tooth to the apex of the nearest root was measured at baseline and at 6th month postoperatively. The difference between the first and second values was recorded as the root migration distance (**Figure 2A, 2B**).

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Table 1. Intra- and intergroups comparison of pre- and postoperative measurements based on age group.

Time points	Groups (mean±SD)		P
	18-30 age	31-55 age	
Interincisal opening (mm)			
Preoperative	49.93±2.25[a]	48.21±2.60[a]	>0.05
3rd day	10.25±1.40[b]	18.97±2.74[b]	**<0.001***
7th day	40.55±2.84[a]	47.27±3.30[a]	**<0.001***
P	**<0.001***	**<0.001***	
Percentage of edema (%)			
3rd day	9.48±3.31	7.34±3.02	**<0.001***
7th day	1.56±1.02	1.36±0.74	>0.05
P	**<0.001***	**<0.001***	
Pain scores (cm)			
3rd day	6.93±0.93	4.82±0.80	**<0.001***
7th day	2.28±0.84	1.00±0.79	**<0.001***
P	**<0.001***	**<0.001***	
Root migration (mm)			
6th month	2.50±0.42	2.26±0.56	0.288

Superscript letters (a and b) show differences between the values within the same column. Accordingly, the values relating to the preoperative and 7th day have no a statistically significant difference in both groups interincisal opening. cm – centimeter; mm – milimeter; SD – standard deviation. * Statistical analysis was used for parameters as follows: Friedman test for comparison of 3 time points in interincisal opening; Wilcoxon signed rank test to determine which time point caused difference for interincisal opening; Mann-Whitney U test for comparison 2 time points between age groups. Levene's test for comparison of root migration distance between age groups. Statistical significance was set at $P<0.05$.

Statistical Analysis

The statistical analysis of the data obtained in our study was performed using SPSS 22.0 (SPSS, Inc., Chicago, IL, USA). The normality of the data was assessed with the Shapiro-Wilk test. To compare quantitative variables between the 2 groups, a Mann-Whitney U test was employed for non-normally distributed data. To examine the changes in within-group parameters between 2 timepoints, a Wilcoxon signed rank test was applied for non-normally distributed variables. In each age group, the Friedman test was used to determine whether there was a difference among the 3 time points in interincisal opening. The Wilcoxon signed rank test was used to determine which time point caused the difference. The Wilcoxon signed rank test was used to compare the changes in edema percentage and pain scores over time. The Mann-Whitney U test was used to compare the scores at each time point between the 2 age groups. Levene's test was used to compare root migration between the age groups. The significance level was set at $P<0.05$.

To assess the calibration of the examiners, who were blinded to the study protocol, root migration values obtained from all of the patients 6 months after coronectomy was determined using Cronbach's alpha. The inter-examiner Cronbach's alpha coefficient was 0.998 ($P<0.001$).

Results

No complications, such as jaw fracture, infection, osteomyelitis, or nerve injury, were observed throughout the study. At the end of 6th month, the remaining roots were not exposed to the oral cavity and none of them required a second operation.

Interincisal Opening, Percentage of Edema, and Pain Scores

The width of interincisal opening on the 3rd day was significantly lower in the 18-30 age group (10.25±1.40 mm) as compared to the 31-55 age group (18.97±2.74 mm; $P<0.001$). The

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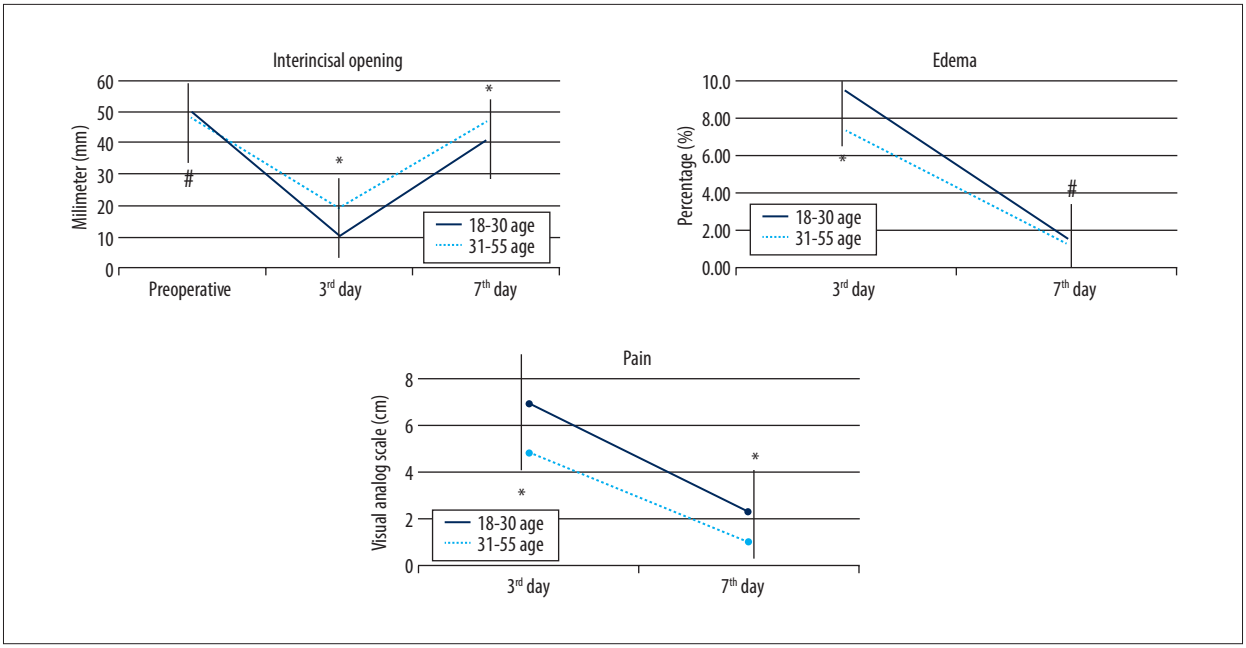


Figure 3. The line diagram showing the relationship between age groups. The width of interincisal opening returns to preoperative values in the 2 age groups. Percentage of edema and pain levels decrease on the 7th day. The symbols on graphic show significance level between the groups. * Statistically significant (P<0.05); # not statistically significant.

mean values in both groups had nearly returned to preoperative values on the 7th day. In addition, the width of interincisal opening on the 7th day was significantly lower in the 18-30 age group (40.55±2.80 mm) as compared to the 31-55 age group (47.27±3.30 mm; P<0.001). The percentage of edema on the 3rd day was higher in the 18-30 age group than in the 31-55 age group (P<0.001). The percentage of edema on the 7th day was lower than that on the 3rd day in both groups (P<0.001). In the 2 age groups, the values obtained on the 7th day were quite close to the preoperative values (P>0.05). No significant difference was observed between the age groups on the 7th day in this regard (P>0.05). According to the VAS data, the average pain score was significantly greater on the 3rd day after the procedure as compared to the 7th day in both age groups (P<0.001). In the 18-30 age group, the average pain score on the 3rd day was higher than in the 31-55 age group (P<0.001). Similarly, the average pain score in the 18-30 age group was higher than in the 31-55 age group on the 7th day postoperatively (P<0.001) (**Table 1, Figure 3**)

Root Migration Distance

The 6th-month root migration values obtained according to age groups are provided in **Table 1**. The average root migration obtained after coronectomy in patients in the 18-30 age group was 2.50±0.42 mm, this value was 2.26±0.56 mm in the 31-55 age group. No statistically significant difference was observed between the age groups in terms of root migration (P=0.288; **Table 1**).

Discussion

When we evaluated the effects of advanced age on postoperative complications of the coronectomy procedure and endodontic lesion formation and root migration distance, our hypothesis was partly rejected. Aging is a complex and multifactorial process in which organ systems and tissues functionally decline and susceptibility to disease increases. In particular, the immune system, which is important for overall health, exhibits a marked sensitivity in this regard. It is characterized by the weakening of immune functions over time, changes in cytokine and chemokine profiles, and decreased immune cell diversity and responsiveness [23,24]. The strength and flexibility of bones are vital to maintaining overall skeletal health and mobility. Aging leads to a decline in these properties due to a combination of changes in bone structure, bone composition, and overall bone function [25,26]. Also, experimental studies have shown that the dental follicle plays a crucial role in transducing these changes within the alveolar bone. The dental follicle forms the periodontal ligament, a structure believed to play an important role in facilitating tooth eruption during the supraosseous stage [27]. Along with the aging process, there is a decrease in fibroblasts and a more organized structure in the periodontal ligament, concomitant with changes in gingival connective tissue [28]. In the present study, while early postoperative complications were more pronounced in young individuals, no difference was observed in terms of root migration and endodontic lesion formation between the 2 age groups.

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Although the extraction of impacted molars is known to be a reliable surgical procedure, many complications can occur during and/or after the surgery, including bleeding, pain, swelling, infection, alveolitis, fractures of adjacent teeth or alveoli, injury to the IAN and lingual nerve, soft-tissue injuries, and iatrogenic mandibular fractures. To mitigate these risks, an alternative method that can be used is coronectomy [29]. Leung et al [30] demonstrated that coronectomy is effective in reducing the risk of IAN damage and that it is safe after 3 years of follow-up. A study by Agbaje et al [31], involving 96 deeply impacted third molars in 64 patients, reported that none of the patients experienced transient or permanent paraesthesia. No cases of paraesthesia, anaesthesia, or endodontic lesions were observed in our study.

The best diagnosis is achieved using three-dimensional imaging systems. However, the use of cone-beam computed tomography (CBCT) as a decisive radiographic method for coronectomy is debated among radiologists and surgeons [32]. Salari et al studied the accuracy of conventional and three-dimensional radiographic modalities for the localization of impacted teeth. They reported that the CBCT has high accuracy in terms of determining the relationships between adjacent teeth, the bucco-lingual and vertical positions, and the bone thickness covering a tooth. In the same study, it was found that the conventional modalities, such as panoramic or lateral cephalograms, had similar accuracy levels regarding assessment of overall inclination, apex morphology, and mesio-distal position of the apex, as compared to CBCT [33]. In addition, several clinical studies have found that a preoperative CBCT examination does not reduce the risk of IAN injury, leading some to consider CBCT imaging unnecessary given its cost [34,35]. No clear guidelines for preoperative radiological assessment have been proposed. In situations in which obtaining a CT scan for each patient is economically or physically unfeasible, panoramic radiographs should be used for evaluation [32]. Pedersen et al [36] conducted a study with 231 patients over 5 years 7 months, evaluating coronectomy outcomes using panoramic radiography. They reported transient numbness in 9 patients postoperatively [36]. In the present study, we decided to use panoramic radiographs for the pre-procedural and immediately post-procedural evaluation.

Recent studies indicate that root migration occurs in most cases of coronectomy. Hatano et al [37] reported that 85.29% of roots migrated in 102 coronectomy cases. Monaco et al observed that 80% of roots had undergone migration at 3-year follow-up [38]. Leung et al's 2018 study found the average root migration was 1.98 mm at 6 months, 2.67 mm at 12 months, 2.92 mm at 24 months, 2.96 mm at 36 months, and 2.80 mm at 60 months postoperatively. Root migration occurred between baseline and 6 months (91.1%) and 6-12 months (61.4%). After 24 months, the migration significantly decreased and ultimately stopped. The study highlights the long-term impact of residual roots, showing that more than 90% of roots underwent migration [13].

Dolanmaz et al [39] reported that the root migration reached 4 mm by the 24th month after surgery. They observed that nearly all roots underwent migration during the first postoperative year, with only one-quarter continuing to migrate 12-24 months postoperatively. Their study suggests that 24 months may be a pivotal point regarding root migration, with no roots migrating beyond 24 months. These findings provide a better understanding of root movement after coronectomy [39]. The radiographic findings show that residual roots migrated away from the canal, eliminating the risk of damage to the IAN in cases in which extraction might be necessary later [40,41]. Out of the 73 patients enrolled in our study, root migration was observed in 72. The average root migration at 6-month follow-up was 2-2.5 mm. No significant difference in root migration was observed between the 2 age groups. In the 31-55 age group, the distance of root migration was similar to that in the 18-30 age group, but this result seems to be inconsistent with evidence on aging process [25-28]. This inconsistency may be due to the 6-month duration of the present study and other variables in the eruption of impacted teeth [42].

Poor prognosis is associated with residual roots that underwent pulp treatment. Plata et al [43] reported that the vitality of the root pulp was maintained after coronectomy over a 3-year follow-up period. Although the vital pulp causes pain, it is an advantage in the coronectomy procedures in which no endodontic lesions occurred around the remaining root and/or roots [43]. In the literature, there are various studies evaluating pain after coronectomy. For example, a prospective evaluation of 50 patients who underwent coronectomy using the Oral Health Impact Profile-14 (OHIP-14) questionnaire followed the improvement of pain. The study found that OHIP-14 scores were highest during the first 3 postoperative days, with the highest average score being recorded on the 1st postoperative day (mean score 26.40±8.67). Average OHIP-14 scores gradually decreased during the first postoperative week, with a mean OHIP-14 score of 9.82±9.15 on the 7th day. Moreover, the OHIP-14 scores were positively correlated with pain scores [44]. The VAS uses a simple straight line, and it may include various labels placed along the line, representing different levels of pain intensity divided into equal intervals [45]. In this study, postoperative pain was analyzed using a VAS and based on the age. The measurements on the 3rd and 7th days postoperatively revealed that there was a significant reduction in pain between them. In addition, pain level was more pronounced in younger patients in this study as compared to older patients. This is likely due to the younger patients' more robust inflammatory response [46]. Interincisal opening distance varies significantly with the age, sex, and stature, along with geographic and

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ethnic variations. A study found that the maximum interincisal opening distance was 50.58±2.16 (37-56 mm) for males and 48.29±3.12 (36-53 mm) for females. The same study examined 4 different age groups ages 18-60, finding that mouth opening decreased with age in both men and women [47], in agreement with our preoperative interincisal opening measurements. However, postoperative interincisal opening was greater in the older group as compared to the younger group in the present study.

The most common complication after surgical extraction of the teeth is edema and postoperative swelling reaches its maximum in 1-2 days, begins to decrease in 3 days, and often disappears by 5-7 days [48]. Intraoperative factors such as prolonged operation time, difficulty extracting the impacted tooth, excessive retraction of the flap, and insufficient surgical technique, and individual factors such as age, sex, and the presence of a systemic disease, lead to increased postoperative edema [49,50]. CT, ultrasonography, or metric methods that are based on reference points on the face or head are used to measure facial swelling. Previous research on postoperative swelling has been controversial because the clinical methods used to evaluate swelling (such as a questionnaire or distance measurement between facial reference points) were not objective and reproducible [51]. The radiation exposure or high cost of three-dimensional imaging has made metric measurements an effective alternative method [52]. In our study, in which facial edema was measured according to 3 planes drawn based on 6 different points, the lower edema percentage on the 3rd day after surgery in the older group as compared to the younger ones disagrees with a previous study [53]. Another study reported that postoperative complications, including pain and swelling, were more common in younger patients than in older ones on the first day after third-molar surgery [54]. Depending on the eruption of the teeth, the main factors, such as deeper impacted tooth and the amount of bone covering the tooth, can complicate the tooth extraction procedure, and this can cause more trauma in young individuals. The surgical difficulty and the prolonged operation time will inevitably cause more tension in the masticatory muscles. According to the results of our study, there is a strong correlation between postoperative pain and trismus, suggesting that pain is one of the main causes of limited mouth opening.

This study has several limitations. One is the use of panoramic radiographs to determine the relationship between the root and nerve and measure root migration. This is due to ethics factors, such as an unwillingness to use high-dose radiation required for three-dimensional tomography. Deviations in the patient's head position can cause significant changes in panoramic radiographs. Angular (buccal or lingual) measurements involve errors in cases involving serious deviations in the head position in cases in which the angle is 10 degrees or more [55]. To avoid the deviations, all panoramic radiographs were obtained by the same person with the standards mentioned in the Methodology section of this article. Another limitation is the fact that only mesio-angular impacted lower third molars were included in this study. Considering the effect of sex on bone metabolism, not performing a comparison in terms of sex can be considered as a limitation of this study.

Conclusions

The present study showed that the remained roots moved away from the IAN in the 6 months. Several articles mention that there are no indications regarding whether any remaining roots must be extracted. In 1 patient, root migration was very limited, likely due to ankylosis. No postoperative endodontic lesions or infections were encountered in any of the patients at the 6th month. According to the results of this study, the coronectomy is a conservative and feasible approach for the treatment of the nerve-related and mesio-angular positioned impacted third molars for patients aged 18-55 years. Studies with larger sample size and longer follow-up period are needed to evaluate the efficacy of coronectomy in various age groups and for individuals with impacted teeth in different positions.

Patient Consent

The patients consented to the use of their radiographic images in publication.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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