



Anatomical positions of the inferior dental canal and its relationship with impacted lower third molars in 18- to 29-year-old Ecuadorians.

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Abstract: The third molars are the dental organs with the most variations in terms of their formation and time of eruption, which can cause several pathologies. The incidence of third molar impaction varies between 20% and 30%, with predominance in females. Through the inferior dental canal, goes the inferior dental nerve to innervate the molars and lower premolars. Recent studies on variations in the position of the lower dental canal have shown a low incidence of variations. Objective: To determine the prevalence of anatomical variations of the inferior dental canal in relation to impacted lower third molars, by means of digital image analysis in patients who attended the X-Ray Imaging Center in Azogues in 2016. Materials and Methods: A cross-sectional study was conducted on patients who attended the center X-Ray Imaging Center in Azogues in 2016. The following variables were analyzed: sex, age, variation of the position of the inferior dental canal in relation to the third impacted molar, the radiographic details according to the Monaco classification, and tooth position according to the Winter classification. In total, 64 radiographs were analyzed. Results: It was found that 5% of participants showed no relation of the inferior dental canal with the lower third molar, 72% had a relation of the dental canal with the third molar, and 23% presented with absence of the third molar. According to the Winter classification, the prevalence was 53% mesioangular, 18% horizontal, 19% vertical, 6% vestibuloversion, and 4% inverted. Conclusion: The third molars present high indexes of relation with the inferior dental canal in 18- to 29-year-old Ecuadorians.

Keywords: dental canal, lower third molar, digital analysis.

INTRODUCTION

Third molars are the teeth with the most variations in terms of their formation and time of eruption. This tooth does not usually erupt completely due to the lack of space in the oral cavity, which can cause disorders in the temporomandibular joint, cysts, or tumors, among other pathologies. According to the classification described by Winter, in relation to the longitudinal axis of the tooth, different positions can occur, such as mesioangular, distoangular, horizontal, inverted and vertical; according to the occlusal plane, vestibuloversion or linguoversion can also be observed (Patel et al., 2017).

The inferior dental nerve is oriented to the internal part of the mandibular branch, then enters through the inferior dental hole and is directed through the canal to innervate the lower molars and premolars (Rangel, 2006). It originates from the posterior trunk of the inferior maxillary

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nerve, which passes downwards and joins the dental artery, then penetrates into the dental canal. It provides collateral branches for the lingual and mylohyoid nerves, and inside the conduit splits into dental branches, with two terminal branches for the chin and the lower incisor nerve (Ruge et al., 2009). Regarding the relationship of the inferior dental canal with the impacted third molar, this is closely related to the apices and also to the second molar, so care must be taken to avoid iatrogenic nerve injury (Barreiro & Duarte, 2014).

Variations of the mandibular canal seen from a panoramic radiograph show a prevalence of <1% (Correr et al., 2013; de Oliveira-Santos et al., 2012), while with computed tomography (CT) and cone beam computed tomography (CBCT), the prevalence is 20 to 30% (Watanabe et al., 2010; Muinelo-Lorenzo et al., 2014). A recent study on the frequency of these variations showed a prevalence of 6.46% in clinical evaluations, 4.20% with panoramic radiography, and 16.25% with CT or CBCT (Haas et al., 2016). Knowledge of the lower dentary is of great importance as it contains large structures of the nervous and circulatory system, so we must avoid causing injuries in the mandibular region. For this, it is essential to know exactly the anatomical variations in a particular subject (Gutiérrez-Ventura et al., 2009).

The aim of this study was to describe the prevalence of anatomical variations of the inferior dental canal in relation to impacted lower third molars, by means of a panoramic digital image analysis in patients who come to the X-Ray Imaging Center in Azogues in 2016.

MATERIALS AND METHODS

A cross-sectional study was carried out on patients who attended the X-Ray Imaging Center in Azogues in 2016 to obtain panoramic radiographs. Bioethical

authorization to conduct the study was granted by the radiographic center and by each of the patients through informed consent.

Panoramic radiographs of patients aged between 18 and 29 years were analyzed, excluding those patients who previously reported having undergone extraction of the lower third molars.

Sixty-four panoramic radiographs were analyzed. The following variables were collected from the data collection form: sex, age, variation of the position of the inferior dental canal in relation to the impacted third molar, radiographic details according to the Monaco classification, and the position according to the Winter classification.

The data were collected in tables using Microsoft Excel 2013 (Microsoft Corp., USA).

RESULTS

Sixty-four panoramic radiographs were analyzed, including 27 males and 37 females.

Table 1 shows the distribution of variations by sex and age. Table 2 shows the radiographic details distribution according to the Monaco classification by sex and age. Table 3 shows the position distribution according to the Winter classification by side of the mandible.

DISCUSSION

According to a study conducted by Pilcón (2015) in patients treated at the National Institute of Child Health, 40.7% presented a vertical position, 27.1% an apical position, and 32.2% a lingual position. In the present study, the proportion of third molars in the vertical position was 19%, mesioangular 53%, horizontal 18%, vestibular 6%, inverted 4%, and distoangular 0%.

TABLE 1. Distribution of variations by sex and age.

	Male 18-23 years n (%)	Female 18-23 years n (%)	Male 24-29 years n (%)	Female 24-29 years n (%)
With variation	12 (19)	15 (23)	7 (11)	12 (19)
Without variation	0 (0)	2 (3)	0 (0)	1 (2)
Third molar absence	2 (3)	3 (5)	6 (9)	4 (6)
Total	14	20	13	17

TABLE 2. Radiographic details distribution according to the Monaco classification by sex and age.

	Male 18-23 years (n)	Female 18-23 years (n)	Male 24-29 years (n)	Female 24-29 years (n)	Total (n)
Apex superposition	0	0	1	1	2
Radiolucency increased	9	13	6	10	38
Interruption of root canal edge	0	1	1	1	3
Deviation of the root canal	4	1	0	1	6
Mandibular canal narrowing	4	6	2	3	15
Total	17	21	10	16	64

TABLE 3. Position distribution according to the Winter classification by side of the mandible

	Right side of the mandible n (%)	Left side of the mandible n (%)
Mesioangular	14 (30)	14 (23)
Vertical	6 (14)	3 (5)
Distoangular	0 (0)	0 (0)
Horizontal	4 (11)	5 (7)
Inverted	0 (0)	1 (4)
Vestibuloversion	1 (4)	1 (2)
Linguoversion	0(0)	0(0)

Studies conducted by *Mela et al. (2014)* and by *Mamani & Evangelista (2014)* to determine the relationship between the mandibular canal and impacted third molars through computed tomography showed that no contact was observed between these structures in 54.3% of males, compared to 53.3% in females. In the present study, a narrowing of the mandibular canal was observed in 28%, 14% of which were on the left side, 12% on the right side, and 2% on both sides; there was a higher prevalence in women (38%) than in men (10%).

In a study by *Barreiro & Duarte (2014)*, a greater prevalence of the vertical and mesioangular position was observed, both with 8%. In addition, 39.1% of the lower third molars on either side were in a position close to the inferior tooth. In the present study, 23% of the population did not have the third molar, 5% without dental relation with the third molar, and 72% with relation to the third molar. In addition, the prevalence of the relation of the inferior tooth

had a predominance of 42% between ages 18 and 23 and 30% between 24 and 29 years of age.

In a study by *Mitra et al. (2017)*, mesioangular impaction was the most common mandibular impaction, with the majority of cases between the ages of 26-30 years of age. In our study, the most common impaction was mesioangular in subjects between 18 and 23 years of age. In a study by *Nadaes et al. (2016)*, the most frequent position was mesioangular (44.5%), followed by horizontal (24.9%), vertical (17.4%), distoangular (12.5%), inverted (0.4%), and linguoangular (0.3%). In our study, the results indicated a predominance of mesioangular (53%), followed by vertical (19%), horizontal (18%), vestibular (6%), and inverted (4%).

CONCLUSION

The third molars present high indexes of relation with the inferior dental canal in 18- to 29-year-old Ecuadorians.

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