

Relación del Canal Mandibular con las Raíces de Terceros Molares en Pacientes Jóvenes de Talca

Relationship Between the Mandibular Canal and the Roots of the Mandibular Third Molars of Young Patients in Talca

Paula Ortiz Cantos* & Jaime San Pedro Valenzuela**

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SUMMARY: The mandibular third molars are teeth that are removed frequently, so it is important to make a good assessment before surgery, given the potential complications and the potential damage to the inferior alveolar nerve. The purpose of this study is to evaluate the relationship between the third molar roots and the mandibular canal in young patients. To achieve this, we evaluated 90 orthopantomographs, with a total sample of 180 mandibular third molars of both sexes, between 15- and 25-year-old patients. Of the total sample, 55.6% were observed to be projected over the mandibular canal, 25.6% were adjacent to the mandibular canal, and 18.9% were not adjacent. In turn, of those projected over the mandibular canal, 88% showed an increase in radiolucence, 6% had canal deviation, 5% had cortical bone disruption, and only 1% had deviation and narrowing; these results are consistent with what other authors found. One of the three most important radiographic signs of potential damage to the inferior alveolar nerve with cortical bone disruption and deviation or narrowing of the canal, the presence of at least two of these signs means a greater likelihood of contact being required to make further studies with non-conventional techniques such as computed tomography.

KEYWORDS: Molar third; Radiography panoramic; Mandible.

INTRODUCTION

Amidst a wide variation in size and shape of mandibular third molars and their roots, often presented semi-erupted or unerupted (Yamaoka *et al.*, 2001), preventive extraction is an option. It has been proven that extraction is more beneficial than waiting for a possible disease or performing a radiographic follow-up every 2 years and the risk of surgery after 40 or 50 years (Kaminishi & Kaminishi, 2004), since there are important pathological changes in pericoronal tissues of these teeth (Sagal, 2005) and in periodontium tissues as well. There may be a radiographically observed thinning of the periodontal space, even reaching an ankylosis of the tooth, making it difficult to extract later. One complication that can occur during the extraction of the mandibular third molar is the inferior alveolar nerve damage. To evaluate this condition,

orthopantomography radiography is the technique of choice, as it has proven to be very useful in identifying the anatomy of the mandibular canal, its variations and relationships, thus helping to reduce the risks during surgery (de Melo Albert *et al.*, 2006).

The development of the canal prior to the formation of the third molar tooth germ can be seen as grooves, the result of compression of the roots on the walls of the canal. When the third molar roots develop, in relation to the mandibular canal, they may come into contact with the bone wall and can grow around it partially or totally. Often, we can observe contact between the roots of the third molars in development with the mandibular canal in adolescents (Figún & Garino, 2006).

* Departamento de Estomatología, Escuela de Odontología, Facultad Cs. de la Salud, Universidad de Talca, Chile.

** Servicio de Radiología, Departamento de Estomatología, Escuela de Odontología, Facultad Cs. de la Salud, Universidad de Talca, Chile.

Several radiographic signs are visible in the orthopantomography, which are used as indicators of a close relationship between the mandibular canal and the third molar roots. Any of the following can be observed: adjacent, projected over the mandibular canal, projected over the mandibular canal with increased radiolucence, with cortical bone disruption of the mandibular canal, deviation and/or narrowing of the same (Monaco *et al.*, 2004; Milodoro & DaBell, 2005, de Melo Albert *et al.*, Hazza'a *et al.*, 2006; Ohman *et al.*, 2006, Nakagawa *et al.*, 2007).

These signs may indicate close proximity and it is not possible to observe the vestibulo-lingual relationship in conventional radiography (de Melo Albert *et al.*). A radiolucent increase in the root of the third mandibular molar projected over the mandibular canal is thought to have resulted from the root making an impression on it. However, this may also be due to a thinning of its vestibular or lingual cortex, in which case it can be seen closer regardless of whether the canal is in the vestibular or lingual position (Mahasantipiya *et al.*, 2005).

If, during the third molar root development, the canal is in the same position, then it is expected to be among the roots; if it is moved somewhere, the result is a deviation. If the third molar root is developed in close relationship with the vestibular or lingual cortex and the mandibular canal is shifted to this side, it then becomes closer to this because of anatomical compression (Mahasantipiya *et al.*). Due to the importance of determining the relationship of the third molar with the mandibular canal, the purpose of this study is to evaluate this relationship in digital orthopantomography on a young patient population in Talca, Chile.

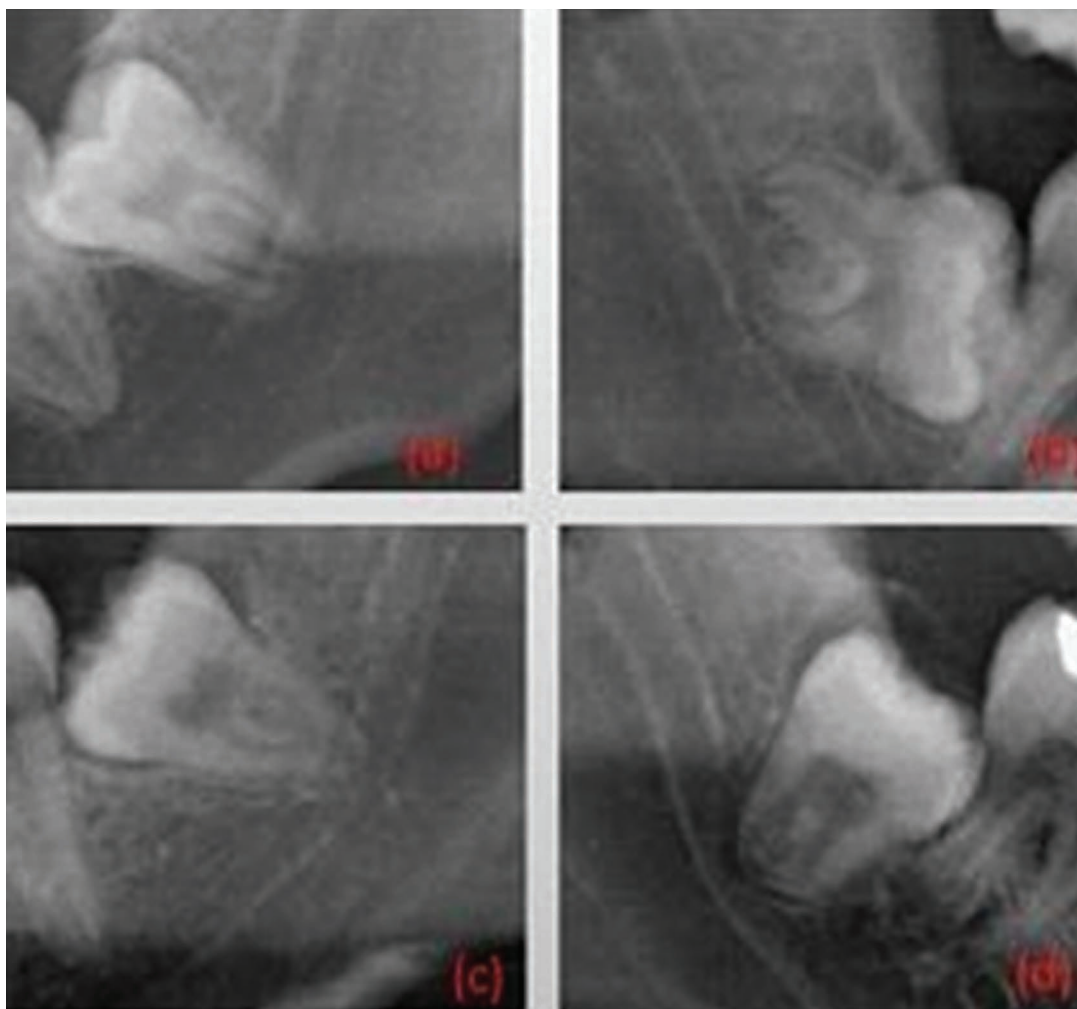
MATERIAL AND METHOD

This is a descriptive transversal study with a sample of 90 digital orthopantomographs of patients who were in the age range 15 and 24 years, 11 months, 30 days. Using data from the archives of a private dental radiology clinic, we evaluated the relationship of the mandibular canal with the roots of third molars with complete root development and apical closure. A total of 180 mandibular third molars were considered.

The radiographic equipment used was a Siemens Sirona XG® Orthophos, analyzing radiographs in TIFF format. The radiographs were analyzed with the help of a specialist in radiology (computer model Packard Bell EasyNote MX455, Intel™ Core™ Duo T2250 CPU with Windows Vista™ Home Basic) who recorded the observations obtained in an SPSS data file tailored specifically for this study. The total sample consisted of 90 patients with 180 mandibular third molars; 50.6% of the patients were male and 49.4% were female. The age range studied was 15–24 years, 11 months, 30 days, with an average of 18.1 years.

The following classification was made (Fig. 1):
(A) Without radiographic signs of proximity: the third molar roots without contact with the mandibular canal
(B) Adjacent: root or roots of the third mandibular molar tangential to the mandibular canal
(C) Projected over the mandibular canal: root or roots of third molar exceed the superior cortical bone of the mandibular canal; under these are several categories (Fig. 2):
(a) With increasing radiolucence: radiolucent area where anatomy and root canal are less defined
(b) Disruption of the superior cortical bone in the mandibular canal





- (c) Deviation: canal curved in the vicinity of the root of the third molar
- (d) Deviation and narrowing: canal curved with decrease in diameter (height) in the vicinity of the third molar root
- (e) Narrowing: decrease in diameter (height) of the mandibular canal.

RESULTS

Of the 180 mandibular third molars analyzed, the highest prevalence was noted in the group projected over the mandibular canal (55.6%), followed by those adjacent (25.6%); the lowest was unrelated (18.9%) (Table I).

Relationship with the mandibular canal	Frecuency (n)	Porcentaje (%)
Without relationship	34	18.9
Adjacent	46	25.6
Over-projected	100	55.6
Total	100	100.0

Of the mandibular third molars observed to be projected over the mandibular canal (n = 100), the most prevalent type of relationship was increased

radiolucence (88%), followed by deviation (6%) and cortical bone disruption (5%); only one case of deviation and narrowing (1%) was observed (Table II).

Over-projected with	Frecuency (n)	Percentaje (%)
increasing radiolucence	88	88.0
Disruption of the cortical bone	5	5.0
Deviation of the canal	6	6.0
Deviation and narrowing	1	1.0
Total	100	100.0

DISCUSSION

In the present study, third molars were classified according to the three most likely relationships (not related, adjacent, or over-projected) and further subclassified into several categories. The results of this study are consistent with findings in other publications where the most frequent sign is over-projection with radiolucence increasing in the roots of the third molar (Owotade *et al.*, 2003; de Melo Albert *et al.*; Hazza'a *et al.*).

Mahasantipiya *et al.*, explained that, when there is increased radiolucence, it may be because the canal 'dug' into the root of the third molar or there exists a thin cortex between the canal and the third molar (the most likely explanation). However, according to our knowledge of radiographic image formation, the reason for the increased radiolucence is the effect of the amount of absorption, so when the rays pass through a structure with lower absorption rates (mandibular canal and periodontal spaces) and projected over the roots of the third molar, the end result will be an area of greater radiolucence, in greater or lesser degree, depending on the thickness of the vestibular and lingual walls of the canal. The presence of over-projection with increased radiolucence is a sign that implies a real contact made between the third molar and mandibular canal; however, the absence of this sign in the orthopantomography radiography does not exclude the possibility of a real contact between the two structures.

The presence or absence of a superior cortex in the mandibular canal in orthopantomography radiography can be related to the degree of corticalization of the superior wall, not necessarily a real hole in the canal (Nakagawa *et al.*). The narrowing of the canal, according to Mahasantipiya *et al.*, may be due to a thinning of the

cortex, independent of the canal's location in the vestibular or lingual wall of the third molar. However, this would explain the disruption of the superior cortex or the increase in radiolucence, depending on whether cortical bone thinning is part of the superior, vestibular or lingual cortical bone. The development of the third molar occurs often in an intimate relationship with the mandibular canal, so it is logical to think that, during this process, the third molar moves the canal and produces an anatomic compression of the same, in which case it will be seen radiographically as a deviation and narrowing.

We must consider that the presence of two or more radiographic signs of close relationship with the mandibular canal increases the likelihood of contact between the roots of the third molar and this necessitates a more complete assessment of the true relationship by use of computed tomography (Monaco *et al.*, 2004). With computed tomography, Ohman *et al.* evaluated the relationship between the third molar and the mandibular canal and found a prevalence of third molars in contact with the canal in 94% of the cases (here, 100% was presented in orthopantomograph radiography as a radiolucent band). This differs with the results of Monaco *et al.*, who reported a 73% contact of parts seen in orthopantomograph radiography as over-projected with increasing radiolucence. However, Monaco *et al.* only used axial images in the computed tomographic analysis, instead of coronal images that are regarded better tools in analyzing contact between the two structures.

Since this study was descriptive, it is not possible to make further statistical analysis. Our results are therefore not conclusive and only give the most prevalent information found in the population studied.

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RESUMEN: Los terceros molares mandibulares son piezas dentarias que se extraen frecuentemente, por lo que es importante realizar una buena evaluación previa de la cirugía considerando las posibles complicaciones como el potencial daño al nervio alveolar inferior. El propósito del presente estudio es evaluar la relación de sus raíces con el canal mandibular en pacientes jóvenes. Para este objeto se evaluaron 90 ortopantomografías con un total de 180 terceros molares mandibulares de ambos sexos entre los 15 y 25 años obteniéndose como resultado que el 55,6% se observaban sobreproyectados, 25,6% adyacentes y 18,9% no presentó relación. A su vez de los sobreproyectados un 88% presentaba aumento de radiolucidez, 6% desviación del canal, 5% interrupción de cortical y sólo 1% desviación y estrechamiento; resultados que concuerdan con otros autores describiéndose como relación más frecuente la sobreproyección con aumento de radiolucidez, siendo éste uno de los tres signos radiográficos más importantes de potencial daño al nervio alveolar inferior junto con interrupción de cortical y desviación o estrechamiento del canal; indicando la presencia de al menos dos de estos signos, una mayor probabilidad de contacto siendo necesario realizar mayores estudios con técnicas no convencionales como tomografía computarizada.

PALABRAS CLAVE: Tercer molar; Radiografía panorámica; Mandíbula.

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Correspondence to:
Dr. Jaime San Pedro
Servicio de Radiología, Departamento de Estomatología
Escuela de Odontología
Facultad de Ciencias de la Salud
Universidad de Talca
Talca - CHILE

Email: jspedro@utalca.cl

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