Mandibulan canalist variations on lower third molar impaction jaw with the panoramic radiography

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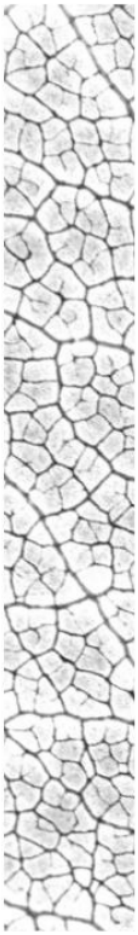

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Mandibulan canalist variations on lower third molar impaction jaw with the panoramic radiography

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Abstract

Background: The third molars of the lower mandibular are the most teeth with impaction because of to lack of eruption site. The canal of mandibular variations in impacted mandibular third molars are associated with a risk of injury be increased to the inferior alveolar nerve at the time of extraction. Radiography of panoramic is the most commonly used radiographic technique to see variations in the location of impacted third molars of mandibular and their relationship to the mandibular canal. It is done to estimate the risk of inferior alveolar nerve injury.

Objective: To determine the distribution of mandibular canal variations on impacted mandibular third molars with panoramic radiographs.

Methods: Study method consist of 60 samples used panoramic radiographic. The sample observers by on the Rood & Shehab classification. To analyze the data of this study using the Friedman test.

Results: The highest distribution of the first distribution was owned by the interruption of the third molar root by 77%, the second was owned by darkening of the root of the third molar by 11%, the third was owned by the narrowing of the of the root of third molar by 6%, and the canal of mandibular diversion was 6%.

Conclusion: The highest distribution of canal interruption of mandibular, followed by darkening of the third molar root of impacted, then narrowing of the third molar root and diversion the canal of mandibular.

Keywords: the third molar impaction, the canal of mandibular, panoramic radiograph

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INTRODUCTION

The third molars of mandibular are the teeth most often impacted in humans. The distribution of impacted third molars ranges from 16.7% to 68.6% and shows no effect of sex on the impact of third molar teeth with a ratio between male and female 1: 1.7.(Hashemipour, Tahmasbi-Arashlow, & Fahimi-Hanzaei, 2013. Kaya, et al. 2010. Quek, et al. 2003). Odontectomy is surgical removal of teeth that does not erupt or impact by opening the mucoperiosteal flap followed by removal of bone covering the impacted tooth (Sarikov, & Juodzbalys, 2014). Postoperative complications related to the canal of mandibular can cause serious consequences such as damage to the inferior alveolar nerve, generally postoperative complications such as swelling, trismus, and pain are relatively easier to handle (Szalma, et al. 2011). The canal of mandibular contains the inferior alveolar artery, the inferior alveolar vein, and the inferior alveolar neurovascular bundle (Juodzbalys, Wang, & Sabalys, 2010).

Several studies have shown four variations amongst the canals of mandibular on third molars of impacted and panoramic radiographic observations leading to an increased risk of injury to the nerve of inferior alveolar, one of them is paresthesia, mandibular canal wall interruption, and mandibular canal diversion. Canal interruptions indicate contact amongst the canal of mandibular and third molars impaction. Darkening of the third molar root indicates loss of layers of the canal of mandibular due to contact with impacted third molars. Canal diversity shows a change in the direction of the canal near the tip of the root of the impacted third molar. Narrowing of the root of the third molar shows a decrease in the diameter of the mandibular canal that approaches the root tip of the third molar.(Monaco, et al. 2004).

Previous studies have also been conducted observations at the Faculty of Dentistry of Thailand's Naresuan University using panoramic radiographs showing that from 256 samples there were 177 mandibular canal interruption images (69.14%), 56 molar root images (21.88%). There were 13 samples

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(5.08%) of mandibular canal diversion, 4 molar root constriction (1.56%).

The frequency of parasthesia inferior alveolar nerve ranges amongst 0.4% and 8.4%, while the permanent risk is usually less than 1 % .10,11 The risk of inferior alveolar nerve parasthesia is increased when there is direct contact among the nerve and the root of the third molar, so it is important to evaluate the topographic relationship between the mandibular canal and impacted third molars before surgery. Many studies reported the most common mandibular canal interruption associated with contact of direc among two structures, which can be paresthesias and a risk injury of nerve(Sedaghatfar, et al. 2005. Neves, et al. 2012; Bayat, & Teymoorian, 2015).

Radiography of panoramic is the most common radiographic technique used by oral and maxillofacial surgeons to see impacted mandibular third molars as well as to estimate the risk of injury to the inferior alveolar nerve.(Neves, et al. 2012). Panoramic radiography has many advantages compared to periapical radiographic techniques. The advantage of panoramic radiographs is that patients feel comfortable when taking panoramic radiographs compared to taking photographs with periapical techniques, a fairly large area covered includes the structure of the jawbone and teeth, can be used for patients who cannot open their mouths, images easily understood by observers. The disadvantage of periapical radiographic is that the position of the film can be uncomfortable for the posterior teeth. Difficulty in placing holders in the lower third molar area. The apical part of the tooth is often not well covered because it can lie on the edge of the film Based on this background, the aims of this study is to find out the variation of the canal of mandibular in the third molar impaction of the mandibular based on the Rood & Shehab classification. In addition to establishing a clinical diagnosis, this study was conducted to determine the distribution of mandibular canal variations in impacted mandibular third molars with panoramic radiographic.

MATERIALS AND METHODS

That study was conducted in the Integrated Specialist Clinic of the Dental and Oral Hospital of Universitas Airlangga, Surabaya. The sample used was panoramic radiographic secondary data that met the criteria with a total of 60 samples. Approval of the ethical worthiness of this research has been given by the Health Research Ethical Clearance Commission (HRECC) Faculty of Dentistry, Universitas Airlangga (125 / HRECC.FODM / Vn / 2018).

Panoramic radiographic secondary data softcopy sample collection taken from the integrated specialist clinic of the Dental and Oral Hospital of Universitas Airlangga, Surabaya according to the required criteria.

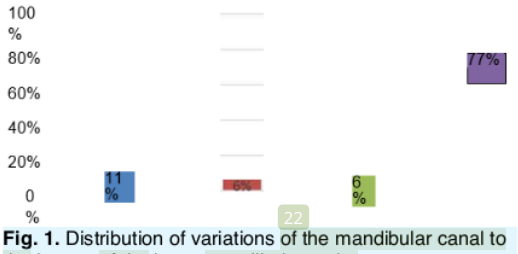

Fig. 1. Distribution of variations of the mandibular canal to the impact of the lower mandibular molar

Table 1. Friedman Test Results from the observations of the three observers

	Darkening	Diversion	Narrowing Root	Interruption
P value	.368	.717	*	.368

Observe the sample conducted by the researcher and 2 supervisors, marking the sample according to variations of the mandibular canal surveyed and based on its classification. Radiographic readings were observed by researchers and supervisors to classify variations of the mandibular canal based on the Rood & Shehab classification, namely of mandibular canal interruption, mandibular canal diversion, darkening of the third molar root, and narrowing of the third molar root, then Friedman test was performed.

RESULTS

The distribution of variations of the canal of mandibular in the impact of the mandibular third molars with panoramic radiographic observations is explained in detail in the diagram in **Fig. 1**.

The diagram with the highest distribution of the first is owned by the third molar root interruption by 77%, the darkening of the third molar root by 11%, the narrowing of the third molar root by 6%, and the canal of mandibular diversion by 6%.

Based on the data on **Table 1**, the results of the study among the three observers showed an Asymp. Sig value greater than 0.05, thus there was no significant difference between the three observers. For root narrowing there was no Asymp. Sig value because the results were the same between the three observers. The same interpretation of assessment of a perception of the observed data showed that the results of the study data are valid, because there was no significant difference.

DISCUSSION

Radiographic observations are very important in evaluating the relationship among the canal of mandibular and third molars of impacted (Tantanapornkul, et al. 2007). Panoramic radiography is the type of radiographic technique most commonly used by oral and maxillofacial surgeons to see impacted third molars and estimate the risk of damage to the nerve

inferior alveolar (Sedaghatfar, August, & Dodson, 2005). Injury of the inferior alveolar nerve is caused by an impacted third molar that is too deep from the occlusal line of the second molar causing contact on the horizontal or vertical part of the mandibular canal giving rise to a variety of features (Gu, 2018).

There are four variations of the mandibular canal with impacted third molars according to the Rood & Shehab classification, namely mandibular canal interruption, darkening of the third molar canal, mandibular canal diversion, and narrowing of the third molar root that can be observed with panoramic radiograph (Szalma, et al. 2011). Canal interruptions indicate contact between the mandibular canal and the impact of third molars. Darkening of the third molar root indicates loss of layers in the canal of mandibular because of contact with third molars impaction. Narrowing of the third molar root indicates a decrease in the diameter of the mandibular canal that approaches the tip of the root of the third molar (Monaco, et al. 2004).Preoperative observation must have accurate data through panoramic radiographic observations to observe direct contact between the mandibular canal and the impact of the third molar. These observations are very useful for informing patients about potential postoperative risks.

The highest distribution of the four figures is interrupted canal madibula by 77%. These studies are similar to studiy conducted by Tantanapornkul et al in 2016 at Naresuan University, from 256 impacted mandibular third molars the mandibular canal interruptions with the highest distribution of 177 teeth (69%). Besodes that, there was also another study conducted by Neves et al in 2012 at the University of Campinas, Brazil with the highest distribution results owned by mandibular canal interruptions of 29 (20.4%) of 142 mandibular third impacted molars, followed by darkening of the root of the third molar impaction 25 (17.6%), mandibular canal diversion 6 (4.2%), constriction of the root of the third molar 5 (3.5%), and the remainder are owned by a combination of some of these variations.

There is a similar study with low distribution results owned by the mandibular canal diversion and narrowing of the impacted third molar root conducted by Neves et al in 2012 at the University of Campinas Brazil, of 142 lower third impacted mandibular molars there were 6 (4.2%) mandibular canal diversion and 5 (3.5%) narrowing of impacted third molars. In addition, there are also other studies with low distribution results owned by the narrowing of the impacted third molars and the canal of the mandibular diversion by Tantanapornkul et al in 2016 at Naresuan University, from 256 impacted mandibular third molars found 13 (5.08%) diversions mandibular canal and 4452 (1.56%) narrowing of impacted third molars.

Darkening of the third molar root occurs when there is a collision of the mandibular canal on the root of the impacted third molar which causes a loss of impacted root density of the third molar thus on the panoramic radiograph the roots appear darker (MacGregor, 1976). Narrowing of the third molar root occurs when there is a change in the direction of the crossing of the mandibular canal around the impacted third molar root thus the impacted root of the third molar adjusts the change in direction of the canal (Seward, 1963). Mandibular Canal diversion occurs due to the change in the direction to the top of mandibular canal because of pressed as it passes through the roots from the impaction of the developing third molars (Rood, & Shehab, 1990; Seward, 1963).

The most frequent appearance of mandibular canal interruption arises because the impact of the third molar that grows urgently toward the lingual contact with the mandibular canal which is also more lingual without accompanying thinning of the mandibular canal layer (Peker, et al. 2014).The darkening of the third molar root and mandibular canal interruption indicates the thinning of the lingual canal bone which is more lingual without accompanying thinning of the mandibular canal layer (Peker, I., et al. 2014). The darkening appearance of the third molar root and mandibular canal interruption indicates bone thinning of the lingual region because mandibular impacted third molars over pressure the mandibular bone of the lingual region causing the lingual region to be thinner than the buccal (Tantanapornkul, et al. 2007).

Extraction technique if there is contact between the impacted third molars and the mandibular canal, such as by applying an extrusion force with orthodontic devices to the impacted third molars to keep the impacted third molars from the mandibular canal, then extraction can be performed without giving injury to the inferior alveolar nerve (Flanagan, 2012).Surgeons the mouth performs a CBCT examination if the panoramic radiographic examination is not accurate enough to determine the position of the mandibular canal and mandibular impacted third molars, hence the anatomical relationship of the two structures can be observed with certainty (Monaco, et al. 2004). Study conducted by Neves et al. in 2012 examined the relationship of impacted third molars with mandibular canals through panoramic photo results, suggested further examination with CBCT. Panoramic radiographs are recommended for preoperative evaluation of third molar impaction because CBCT examination has not been able to be conducted in some developing countries due to obstructed socioeconomic conditions and CBCT examination also provides a high dose of radiation exposure (Tantanapornkul, et al. 2007).

CONCLUSION

The canal of mandibular variations in the impact of the third molar of mandibular, Root and Shehab classification obtained the highest distribution of

mandibular canal interruption, followed by darkening of the impacted third molar root, then canal of mandibular diversion and narrowing of the third molar root.

REFERENCES

Bayat, M., & Teymoorian, A. (2015). A Study on Gravimeteric Situation in East of Uromieh Lake Region with Determination of Suitable Bouguer Density. *International Journal of Geography and Geology*, *4*(9), 146-154.

Flanagan, D. (2012). Forced extrusion for removal of impacted third molars close to the mandibular canal. *Revista Española de Cirugía Oral y Maxilofacial*, *34*(1), 25-30.

Gomes, A. C. A., do Egito Vasconcelos, B. C., de Oliveira Silva, E. D., de França Caldas Jr, A., & Neto, I. C. P. (2008). Sensitivity and specificity of pantomography to predict inferior alveolar nerve damage during extraction of impacted lower third molars. *Journal of oral and maxillofacial surgery*, *66*(2), 256-259.

Gu, L., Zhu, C., Chen, K., Liu, X., & Tang, Z. (2018). Anatomic study of the position of the mandibular canal and corresponding mandibular third molar on cone-beam computed tomography images. *Surgical and Radiologic Anatomy*, *40*(6), 609-614.

Hashemipour, M. A., Tahmasbi-Arashlow, M., & Fahimi-Hanzaei, F. (2013). Incidence of impacted mandibular and maxillary third molars: a radiographic study in a Southeast Iran population. *Medicina oral, patologia oral y cirugia bucal*, *18*(1), e140.

Jerjes, W., Swinson, B., Moles, D. R., El-Maaytah, M., Banu, B., Upile, T., ... & Kumar, S. (2006). Permanent sensory nerve impairment following third molar surgery: a prospective study. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*, *102*(4), e1-e7.

Juodzbalys, G., Wang, H. L., & Sabalys, G. (2010). Anatomy of mandibular vital structures. Part I: mandibular canal and inferior alveolar neurovascular bundle in relation with dental implantology. *Journal of oral & maxillofacial research*, *1*(1).

Kaya, G. Ş., Aslan, M., Omezli, M. M., & Dayi, E. (2010). Some morphological features related to mandibular third molar impaction.

MacGregor, A. J. (1976). The radiological assessment of ectopic lower third molars. DDSc Thesis, University of Leeds.

Monaco, G., Montevecchi, M., Bonetti, G. A., Gatto, M. R. A., & Checchi, L. (2004). Reliability of panoramic radiography in evaluating the topographic relationship between the mandibular canal and impacted third molars. *The Journal of the American Dental Association*, *135*(3), 312-318.

Neves, F. S., Souza, T. C., Almeida, S. M., Haiter-Neto, F., Freitas, D. Q., & Bóscolo, F. N. (2012). Correlation of panoramic radiography and cone beam CT findings in the assessment of the relationship between impacted mandibular third molars and the mandibular canal. *Dentomaxillofacial radiology*, *41*(7), 553-557.

Peker, I., Sarikir, C., Alkurt, M. T., & Zor, Z. F. (2014). Panoramic radiography and cone-beam computed tomography findings in preoperative examination of impacted mandibular third molars. *BMC oral health*, *14*(1), 71.

Quek, S. L., Tay, C. K., Tay, K. H., Toh, S. L., & Lim, K. C. (2003). Pattern of third molar impaction in a Singapore Chinese population: a retrospective radiographic survey. *International journal of oral and maxillofacial surgery*, *32*(5), 548-552.

Rood, J. P., & Shehab, B. N. (1990). The radiological prediction of inferior alveolar nerve injury during third molar surgery. *British Journal of Oral and Maxillofacial Surgery*, *28*(1), 20-25.

Sarikov, R., & Juodzbalys, G. (2014). Inferior alveolar nerve injury after mandibular third molar extraction: a literature review. *Journal of oral & maxillofacial research*, *5*(4).

Sedaghatfar, M., August, M. A., & Dodson, T. B. (2005). Panoramic radiographic findings as predictors of inferior alveolar nerve exposure following third molar extraction. *Journal of oral and maxillofacial surgery*, *63*(1), 3-7.

Seward, G. R. (1963). Radiology in general dental practice: VIII-Assessment of lower third molars. British Dental Journal, 115,145.

Szalma, J., Lempel, E., Jeges, S., & Olasz, L. (2011). Darkening of third molar roots: panoramic radiographic associations with inferior alveolar nerve exposure. *Journal of oral and maxillofacial surgery*, *69*(6), 1544-1549.

Tantanapornkul, W., Okouchi, K., Fujiwara, Y., Yamashiro, M., Maruoka, Y., Ohbayashi, N., & Kurabayashi, T. (2007). A comparative study of cone-beam computed tomography and conventional panoramic radiography in assessing the topographic relationship between the mandibular canal and impacted third molars. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*, *103*(2), 253-259.

Whaites E. 2007. Essensial Of Dental Radiograf. 4th ed. Philadelpia Elsevier. Pp 25-7, 188, 194.

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